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A

MEDICAL SURVEY OF

THE

WESTERN ADEN PROTECTORATE

1939-1940

CLOSED UNTIL
1971

BY

DR. P. W. R. PETRIE AND DR. K. S. SEAL

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WESTERN ADEN PROTECTORATE MEDICAL SURVEY 1939-40

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ADEN,

9th February, 1943

Sir,

We have the honour to present herewith a report on the Medical Survey called for by Sir Bernard Reilly, then Governor of Aden in his letter of March, 1939 to the Right Honourable Malcolm MacDonald, M.P., then His Majesty's Secretary of State for the Colonies and for the performing of which the first of the undersigned was appointed by a letter from the Colonial Office dated 28th June, 1939.

2. The actual work of the survey had to be suspended before completion because of the exigencies of the war situation and the Medical Officer of the survey was transferred to the British Medical Mission at San'a, El Yemen, while his assistant was transferred to the Aden Colony Medical Department.

3. At the suggestion of Dr. A. C. H. Smart, Chief Medical Adviser to the Secretary of State for the Colonies, advantage was taken of the fact that both of us were in Aden at the end of 1942 to prepare this report of the area surveyed.

4. It is hoped that, incomplete as it is, and prepared at such a distance from medical authorities whose advice we might have sought, this report may yet fulfil the purpose of outlining the medical needs of the Western Aden Protectorate.

We have the honour to be, Sir,
Your most obedient and
humble servants,

P. W. R. PETRIE
M.B.,Ch.B.,D.T.M. & H.
Survey Medical Officer

K. S. SEAL
L.R.C.P. & S.
(Ed.)
Asst. Survey
Officer

The Right Honourable Oliver Stanley, M.P.,
His Majesty's Secretary of State for the Colonies,
LONDON.

CHAPTER I

INTRODUCTION

HISTORY

Since the occupation of Aden by the British in 1839 it has been the policy of successive representatives of His Majesty's Government to enter into friendly treaty relationship with the various chiefs and tribal rulers immediately inland from Aden and along the maritime belt of the South Coast of Arabia.

These Chiefs with their peoples and territories now form the Protectorate of Aden. The Protectorate has an area of 112,000 sq. miles and its coastline stretches from Husn Murad (near Bab el Mandab), at the South West corner of Arabia, to Ras Dharbat Ali some six hundred miles along the coast, and there it meets the coastline of the Sultanate of Muscat and Oman. The Dhufar section of that Sultanate forms the Protectorate's Eastern boundary.

The Protectorate stretches inland for varying distances and is bounded on the north and west by the kingdom of Yemen and the Ruba el Khali.

The Protectorate is divided for practical purposes into two sections, the Western Aden Protectorate and the Eastern Aden Protectorate.

The Medical Survey with which this report is concerned was planned to cover the Western Aden Protectorate only.

The Western Aden Protectorate comprises that section of the Protectorate west of and including the upper and lower Aulaki Sultanates and the Beihani Sultanate. This area is divided into Sultanates and Tribal Confederations, and the inhabitants are for the most part agricultural, though a few are nomadic. Several of the tribes and subtribes pay very little allegiance to their nominal rulers.

The people are almost entirely Arab and their religion Islam. The only exceptions are the few Jewish settlements scattered here and there throughout South Arabia. There are no European or other settlers in the whole area.

Until 1937, Aden was administered as part of British India. Before April, 1928 Aden itself was an Army Command, the Military and Civil commands being vested in one person styled the General Officer Commanding and Resident. In the same way the Senior Medical Officer of the station was styled Assistant Director of Medical Services, Aden Brigade, and Civil Administrative Medical Officer. In 1928, when the Army Command was replaced by an Air Force Command, the Military and Civil Administrations were divided. The Civil Administration was vested in a Resident who was also Commander-in-Chief. In the separation of the Military Medical Administration from the Civil, the Principal Medical Officer, Aden Command, was an officer of the R.A.F. Medical Service and the Civil Administrative Medical Officer an officer of the Indian Medical Service. By the time of this change-over the control of the Protectorate had passed from the Indian Government to the British Government acting through the Colonial Office; the Government of Aden then began to turn its attention to the medical needs of the Protectorate.

Up to that time officers travelling in the Protectorate very occasionally sent sick persons to the Aden Civil Hospital for treatment, or the Sultans themselves sent recommended patients, but no medical work was being done in the Protectorate itself.

In 1927 a tentative scheme of Tribal Dispensaries was started but no detailed planning took place until 1934. This scheme will be dealt with more fully in the appropriate section of this report but it may be of interest to note here that from the year of its inception (1927) the training of the dispensers and such supervision of their work as was possible fell to the staff of the Keith Falconer Hospital of the Church of Scotland Mission at Sheikh Othman, and the present writer, who is a member of that Mission, has been in close co-operation with the Aden Government throughout the whole period of the evolution of the scheme.

The medical services of Aden, under the I.M.S. Officers, dealt with Protectorate patients mainly as they came to the Civil Hospital. Their only other contact with the Protectorate was through a dispensary started at Lahej by H.H. the 'Abdali Sultan in 1932. Thus it was that in his "Medical Survey of Aden" Lieut. Col. PHIPSON the Senior Medical Officer was able to say "this (the Lahej dispensary) is the first attempt at medical relief of any kind outside the Settlement limits." (Medical Survey of Aden 1933, page 25.) But at that very time, and, it would appear, without the knowledge of the S.M.O., the Aden Political Staff were maintaining a medical service for the tribal areas through dispensers trained at the Mission Hospital.

This somewhat anomalous position continued up to the time (1937) when Aden became a Colony and obtained its medical officers from the Colonial Medical Service.

The first Governor of Aden under its new status as a Crown Colony, Sir Bernard REILLY, and the first Colonial Medical Service Chief, Dr. J. C. R. BUCHANAN, very soon decided that while various medical advances had been made in Aden itself there was an urgent need for a fuller medical provision for the Protectorate.

In March 1939 the Governor, after consultation with Dr. BUCHANAN, sent a recommendation on the matter to the Right Hon. Malcolm MacDONALD, M.P., then Secretary of State for the Colonies. The following quotation from that despatch is of interest:-

"I have the honour to address you on the subject of the formation of a Protectorate Medical Service.

2. I have considered for some time that this is needed to replace the present system of tribal dispensaries which are in the hands of partially trained Arab dressers and which, owing to their primitive nature and lack of proper medical supervision do not fulfil all that is required of them.

3. I am of opinion that, with the more forward policy which His Majesty's Government is now adopting with regard to the Aden Protectorate, the time is ripe to give its people the benefit of a better medical organization, and that this can be effected only by the formation of a Medical Service and the provision of well stocked dispensaries at selected tribal centres, in the charge of dispensers and dressers with a higher degree of training than is now the case, the whole being under the supervision of an officer of the Colonial Medical Service. The Protectorate Medical Service would be linked with the Medical Service of the Colony and the personnel would, in due course, be interchangeable.

4. After consultation with Dr. Buchanan, the Senior Medical Officer of the Colony, I consider that, to enable such a scheme to be started, it is necessary to have a fuller knowledge than is at present available of the areas which are most in need of such dispensaries from the point of view of the density of population and prevalent diseases. To obtain this knowledge a preliminary medical survey of the Protectorate is essential. This therefore is the first step to be undertaken."

Towards the end of this despatch Sir Bernard REILLY suggested that "the appointment of Medical Officer for the survey be offered to Dr. PETRIE."

The Survey was sanctioned and in a letter from the Colonial Office dated 28th June 1939 Dr. PETRIE was offered the appointment and accepted. This letter from the Colonial Office repeated the terms of reference for the survey as outlined in the despatch of the Governor of Aden. The Colonial Office letter at para. 2 reads:-

"The purpose of the survey is to investigate and report upon the areas which are most in need of improved dispensaries from the point of view of density of population and of prevalent diseases. The survey is expected to take not more than nine months".

In another letter from the Colonial Office, also dated 28th June 1939, it was suggested that precedence should be given to the investigation of malaria and bilharziasis. Dr. PETRIE was also informed that Dr. MUIR of the British Leprosy Relief Association had suggested a leprosy survey of the Protectorate. It was left to the Survey Officers to investigate leprosy, if possible, during the survey.

The next few months were spent by Dr. PETRIE in getting together equipment, asking people for advice and in finding a medical colleague.

At first it was suggested that Dr. PETRIE should take his wife (Dr. Eleanor PETRIE) as colleague - for this arrangement would have been an advantage for obtaining adequate information about the women of the area, but it was not possible. Ultimately the appointment was given to Dr. K. S. SEAL, who had just finished his studies in Edinburgh before sailing for Aden.

Of those who were asked for advice none was found who had ever heard of a survey with so wide a reference or to be undertaken in so short a time. Our principal adviser was of course Dr. A. J. R. O'BRIEN, Chief Medical Adviser to the Secretary of State for the Colonies, and it is a matter of great regret that he has died during the period of the survey. His kindly and practical help was most useful to us. Our sincere thanks are due also to Professor P. A. BUXTON and Mr. H. S. LEESON of the London School of Hygiene and Tropical Medicine, to Dr. Hugh SCOTT and Mr. E. B. BRITTON of the Entomology Department of the British Museum. They not only gave us advice but supplied us with collecting apparatus for entomological specimens.

For advice on statistical methods and suggestions for useful investigations we are indebted to Major P. Granville EDGE, and for special instructions on the malaria side of the work our thanks are due to Col. J. A. SINTON. Thanks are also due to Lieut. Col. E. D. W. GREIG and Lieut. Col. E. H. V. HODGE of the Tropical Medicine Department in Edinburgh for opportunities of trying various laboratory methods in the Tropical Medicine Laboratory in the Royal Infirmary of Edinburgh and for the loan of various books.

Arrangements seemed to be proceeding reasonably well for the survey when war broke out, and it appeared for a time that the whole project would be abandoned. However, on September 22nd, 1939, the Colonial Office wrote;-

"we have now decided that, in spite of the outbreak of war, the medical survey should proceed on the lines already approved."

But the position had become difficult. The firms from whom equipment had been ordered had to get special permits to allow certain articles to leave the country and delay seemed inevitable. It was important that we should not lose the cooler season in Aden so we finally decided to sail without the equipment and the Crown Agents arranged to send it on to us as soon as possible.

We arrived in Aden early in December, 1939, and, in spite of our lack of equipment, were able to set off on our first tour within about ten days of our arrival. This was made possible by the very cordial help of His Excellency the Governor and the Secretariat Staff, by the willing co-operation of the Medical Officers of the European General Hospital, the Civil Hospital, the Royal Air Force Hospital and the Keith Falconer Hospital. These all helped in various ways to provide us with essential medical surgical and laboratory equipment. Help in camping and other gear was also given by the Aden Protectorate Store and the Aden Port Trust.

INFORMATION FROM EARLIER EXPERIENCE

Medical experience in South Arabia had already been gained by Dr. PETRIE before this survey was undertaken and from that experience it was possible to form some idea of the conditions likely to be met with. This experience was gained:-

i. at the Mission Hospital at Sheikh Othman.
ii. during various medical journeys in South Arabia, and
iii. at the Yemeni Government Hospital at San'a.

i. A review of some 29,000 cases seen at the Sheikh Othman hospital during four years showed that more than half could be accounted for under thirteen heads as in the accompanying table:-

	Cases	Deaths
Dysentery	297	22
Gonorrhoea	509	0
Syphilis	500	0
Leprosy	211	6
Malaria	4337	8
Tuberculosis		
i. of Lungs	694	9
ii. other forms	392	2
Worm infections	41	0
Avitaminosis	75	0
Eye affections	4018	0
Respiratory disorders other than tuberculosis	1328	10
Ulcerative skin conditions	3455	7
Urinary conditions other than Nephritis and Gonococcal infections	666	19

The table accounts for 16,523 out of 28,969 cases and 83 out of a total of 139 deaths.

Most of the patients visiting the hospital at Sheikh Othman come from outside the Colony. The table therefore gives a rough indication of the conditions likely to be encountered. Some comments on the conditions are worth making:-

The dysentery cases were almost entirely bacillary and it is to be noted that dysentery shows the highest percentage death rate on the list.

The patients with venereal diseases, unlike those with the other conditions in the table, come mainly from the Colony. The only exception to this is that for years cases of "bejel" from beyond the Colony have been included in this section.

Most of the cases of leprosy came from Yemen but isolated cases were listed as coming from Hadhramaut, Dhala', Lahej and Abyen in the Protectorate.

Malaria, until recently, occurred both in the Colony and outside. The cases from the Colony are now few. The main districts known to send in malaria cases from the Protectorate were Lahej and Museimir but the whole Protectorate was thought to be malarious and large outbreaks had occurred in Yafa'; since the survey began there have been two in the Dhala' area.

The low death rate in the tuberculosis returns is to be accounted for by the fact that most of these cases were out-patients and those who died in their homes are not recorded in the hospital returns.

The intestinal worm infections were mostly with round worms and tape worms. A number of guinea worms and hydatids were also seen. No cases of ankylostomiasis were diagnosed at Sheikh Othman, but recently in the Civil Hospital Dr. Murphy has had cases from Lahej.

Of the cases of avitaminosis a few were due to rickets, but by far the largest number were due to scurvy.

The eye conditions were in patients both from the Colony and beyond. Trachoma was present in the great majority of these cases.

The important items in the "other urinary conditions" were bilharzial infection and stone in the bladder. In addition to the cases in the Sheikh Othman, the R.A.F. had had an outbreak of bilharziasis in men who had bathed in Wadi Tiban. Cases of bilharziasis which came to Sheikh Othman from the Protectorate were mostly from the Dhala' and Museimir districts. Most of the deaths occurred in cases operated on for stone in bladder.

Many of the cases listed as "ulcerative" were cases of Yemen ulcer, others were cases of mycetoma. Both these conditions attacked mainly the ankle region and a number required amputation.

ii. Medical journeys had verified Museimir and Lahej as malarious districts, and Museimir and Dhala' as bilharzial areas. In 1931 investigation of a case in Ta'iz had revealed what was probably the first known case of intestinal bilharziasis in South Arabia, the infection was with B. mansoni.

It was largely as a result of journeys to inspect the tribal dispensaries that recommendations had been made for the regular payment of dispensers. It seemed obvious on these visits that these dispensaries could never be self supporting. This is more fully discussed in Chapter IV.

iii. Various diseases were met with in San'a which were not seen in Aden and it was thought that some of these might be found in the highlands of the Protectorate where altitudes similar to that of San'a are found (c.8,000 ft.)

In 1938, of 238 in-patients in the British section of the San'a hospital, 6 were suffering from typhus and 25 from relapsing fever. It is thought that both are louse borne. Such cases, if they occurred in the Protectorate, would not often be able to travel to Aden for treatment. Recently one case of relapsing fever has been described from the Civil Hospital from the Yemeni border beyond Dhala'.

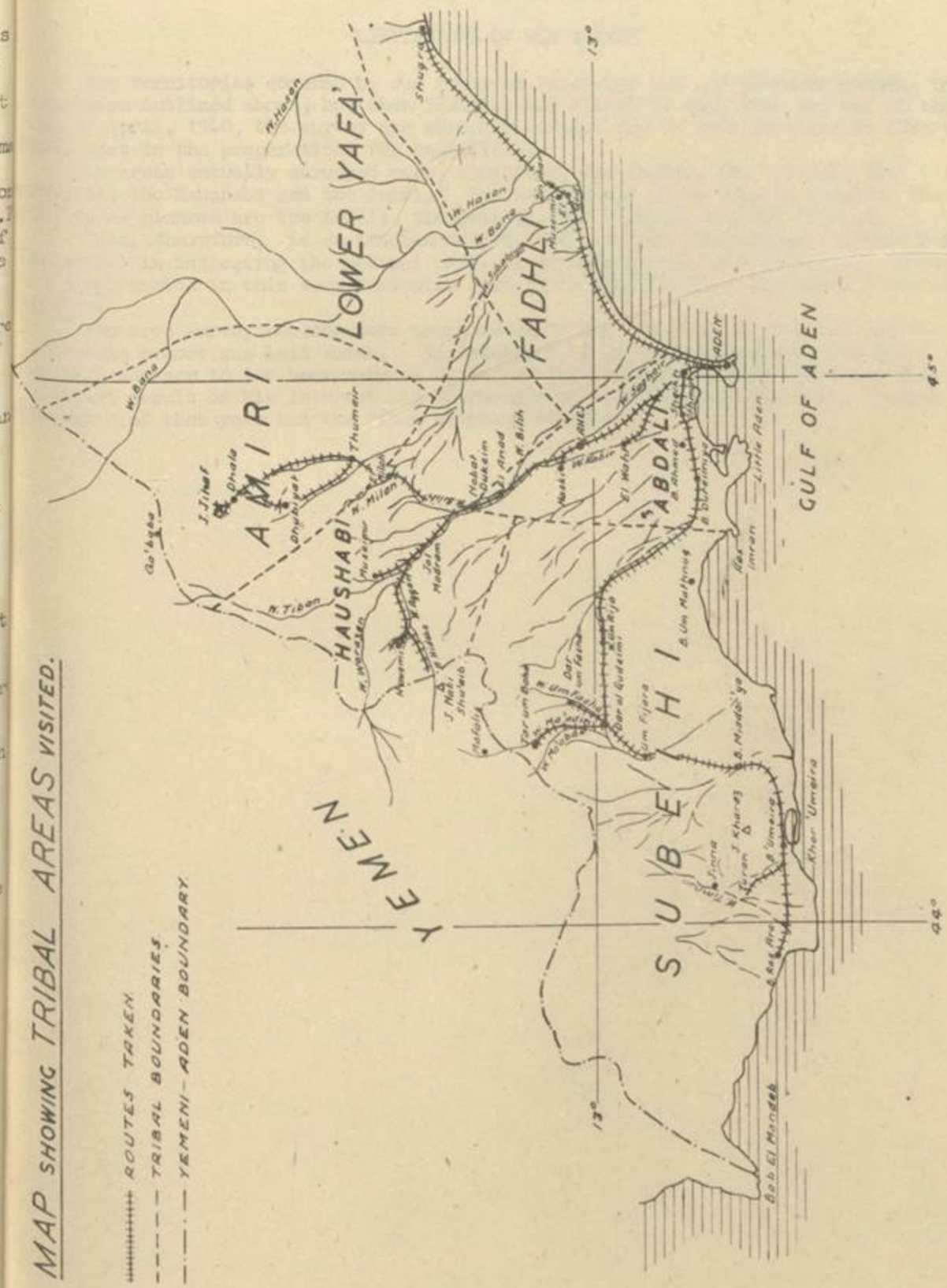
THE SURVEY METHOD (See Map)

As an initial plan we divided the area into tribal districts, but we took geographical rather than political boundaries. In this way we planned to visit the areas as follows:-

December	Fadhli.
January	'Abdali.
February	Subeihi.
March	Haushabi.
April	Amiri.
May	Yafa'i.
June	Beihani.
July	'Audhali.
August	'Aulaqi.

The tribal areas themselves offer very varying geographical conditions, and it was therefore thought desirable to select at least two places in each tribal area, and in this way to sample as many different conditions as possible in the time. It seemed best on the whole to take the low-lying districts, especially those along the sea shore first, before the hot weather should come, and to plan our visits to the high areas for the hotter months.

We planned in each case to settle in the chosen village or district for about ten days and to make reports on as many of the people as we could persuade to be examined. For the first day or so we usually saw and treated the sick taking the opportunity as it offered to explain to the elders of the village our desire to see the fit as well. We also examined the conditions of water supply, housing, sanitation, nutrition, and made notes on points relating to malaria and bilharziasis where these seemed relevant. The various forms used are reproduced in Appendix I.



MAP SHOWING TRIBAL AREAS VISITED.

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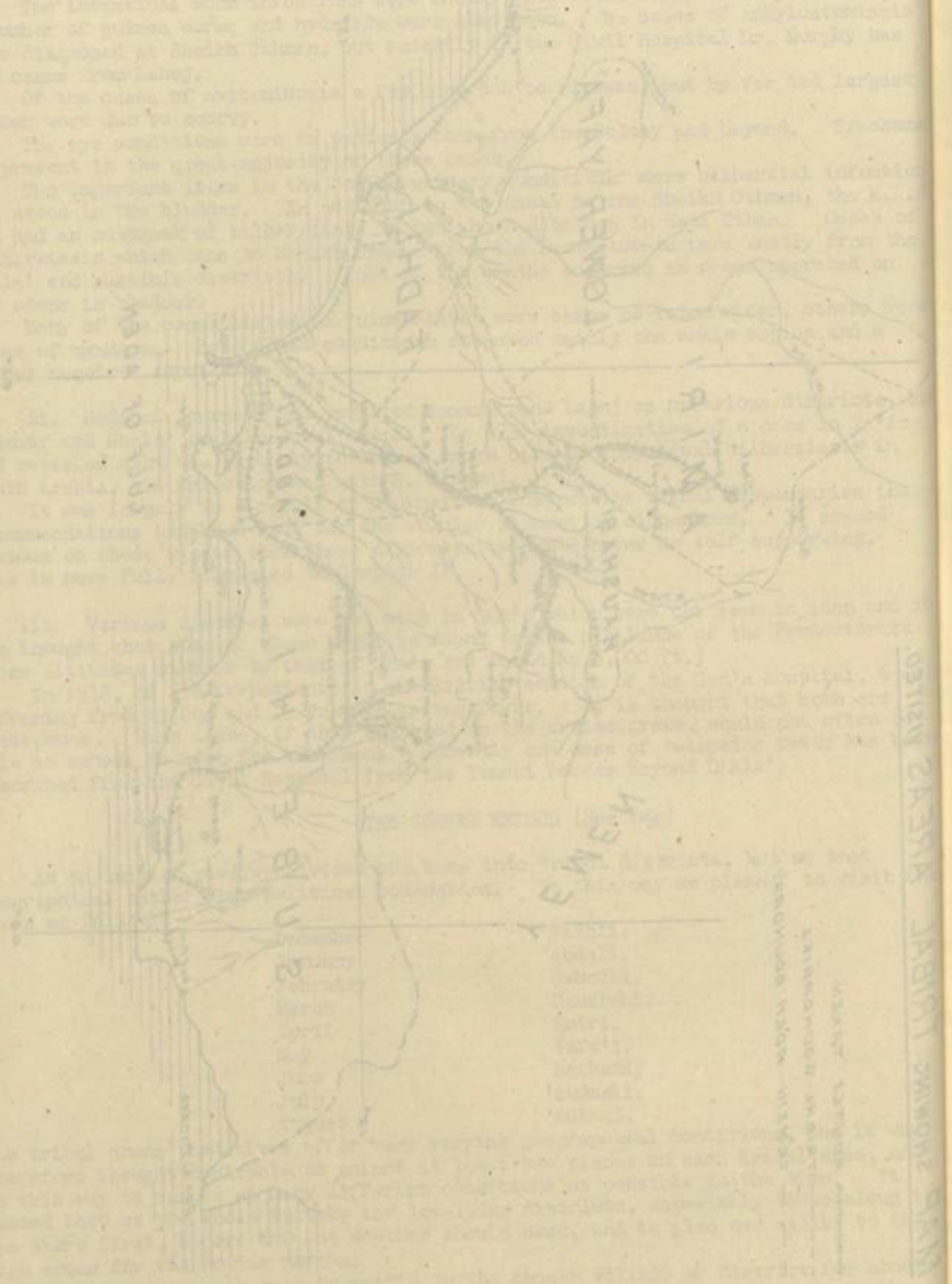


In our records of examinations we kept the sexes separate and, by a system of coloured cards, kept the following age groups separate:-

0 - 1, 1 - 2, 2 - 10, 10 - 15,
15 - 45, 45 and over.

LIMITATIONS OF THE SURVEY

The territories covered by our terms of reference and our plans for covering them have been outlined above, but when Italy seemed likely to come into the war at the end of April, 1940, the survey was abruptly stopped and we were recalled to Aden to take part in the preparations for hostilities.

The areas actually surveyed were, therefore, the Fadhli, the 'Abdali, the Subeihi, the Haushabi and the Amiri. The areas still to be done to complete the survey as planned are the Yafa'i, the Beihani, the 'Audhali and the 'Aulaqi.

This, therefore, is an interim report, but with the limitations outlined it may be useful in indicating the medical problems offered by the area surveyed. Though it is presented in this very tentative form it is hoped that it may serve a useful purpose.

The area survey records were prepared and filed for future reference and then the whole report was laid aside. In October 1942 Dr. A. G. H. Smart, now Chief Medical Adviser to the Secretary of State for the Colonies visited Aden, and it is as a direct result of his interest and encouragement that the work was taken up again in December of that year and the final chapters completed.

CHAPTER II

AREA REPORTS

In this chapter the visits to each tribal area are reported in detail and from these data the Findings and Recommendations presented in Chapter III are arrived at.

There are eleven sections to this Chapter - two concerning each of the tribal areas Fadhli, 'Abdali, Subeihi and Amiri and three concerning the Haushabi. In detail these sections are:- Shuqra, and Abyan (Fadhli), Haski and El Waht ('Abdali), Tor am Baha and Khor Umeira (Subeihi), Museimir, Kirsh and El Milah (Haushabi), Jebel Jehaf and Dhubiyat (Amiri).

Each section is set out as follows: (i) A general description of the area together with a brief account of the journey to it - this is accompanied by a map, (ii) A statement of the results found on examination of the people; the number seen, their ages, sex, occupation etc.; in fact, the results found by using Chart No.1 in Appendix I, (iii) A statement of the conditions pertaining to water supply, nutrition, sanitation, housing, (iv) Special investigation relating to bilharziasis and malaria. Much of this chapter is made up of tables of figures and these will be found to vary greatly in value, some, such as findings on general cleanliness, may seem of very little value and had there been more time to discuss the matter with authorities these might with advantage have been omitted, but for the present it has been deemed best to present the whole bulk of data so that should it later be needed it may be available.

Finally in an attempt to avoid completely losing sight of the wood for the trees a short comment is inserted at the end of each section on "examination of the people", and frequently at the other sections as well, in an attempt to sort out the essential from the less important.

THE FADHLI TRIBAL DISTRICT

The choice of the Fadhli country for our first survey was not, as it turned out, a very happy one; but the reasons for choosing it seemed adequate at the time. First, our tentage and other equipment had not arrived in Aden and we knew that at Shuqra there was a guest house in which we might expect to be housed so that no tentage would be required. Second, the Fadhli country being one of the coastal districts, could be more comfortably tackled in the winter months before the hotter weather began.

GEOGRAPHY OF THE FADHLI COUNTRY

The Fadhli country is a strip of land about fifteen to twenty miles wide lying along the sea coast east of Aden for about one hundred miles to Maqatain-es-Sagheir. The Sultan, whose capital is at Shuqra, is - subject to his treaty relations with Aden - an absolute ruler. The populace are his serfs. The fishermen fish for the Sultan's profit. The landworkers grow produce for the Sultan's benefit and even the shepherds contribute their portion whenever the Sultan's men can squeeze it out of them.

These three occupations, fishing, agriculture and animal husbandry represent fairly accurately the three divisions into which the country is naturally divided, viz:-

(i) The agricultural district of Abyan and Saloum.
(ii) The coastal plain with its fishing villages,
(iii) The foothills with the shepherds and their sheep and goats.

(i) The agricultural district occupies a roughly triangular piece of ground with its base towards the sea and its apex in the foothills. The wedge is formed of good fertile soil brought down by the flood waters of several wadis. Of these the most important are the Wadi Bana and the Wadi Hasan. Less important than these but also worthy of mention in this connection is the wadi system called the Sail-es-Sunabiya (see Map facing page 4).

At its base near the sea this triangular area is some sixteen miles across the tapers to something less than two miles at its apex twenty miles inland, where the two main wadis come quite near to each other. In addition to the richness of the soil in this region there is a plentiful supply of water for irrigating the fields during the rainy season, and even at other times of the year good water can be obtained from surface wells.

In the upper, apical, section of the wedge both wadis are perennial streams but a little further down the Wadi Hasan goes dry; the Wadi Bana, however, does not lose itself in the sand until within ten miles of the sea.

In addition to its main course it supplies an important irrigation channel for a wide area to the east and to within eight miles of the sea.

The Haidera Mansur sub-tribe, who live in the upper part of this fertile triangle, are less directly under the Sultan than the people of Abyan and Es-Salum nearer the coast.

(ii) The coastal plain. This plain is about twenty miles wide at its western end but as one travels eastwards the mountain range which bounds it on the north gradually comes nearer the sea till at Shuqra the plain is only some three miles across; twenty miles further east the hills come down to the shore.

For the most part the coastal plain is an uninhabited land of barren sand dunes dotted with stunted scrub. Near the edges of the fertile triangle, where the scrub is greener, it supports a few flocks of sheep and goats. Here and there along the coast there are little fishing villages, as at Sheikh Abdulla, but even these are few and very small. The only settlement of any size in the coastal plain is Shuqra.

(iii) The foothills. A range of hills runs roughly east and west through the whole length of the Fadhli country. These hills rise to some 2,000 ft. at their crest. At the western end of the Fadhli country the hills are about twenty miles from the sea, then, after their continuity has been broken by the apical part of the fertile triangle, they are twelve miles inland and they continue to approach the shore until east of Shuqra where, as already noted, they come down to the sea.

The journey in Fadhli country to Shuqra

The party of six was composed of two doctors, Dr. Seal and myself, a medical assistant, (This was to have been a hospital-trained boy from Aden but as he was not available we had to take in his place an Aden house boy who had at one time done a few months work in hospital), a cook and two personal servants. This was the regular composition of the staff throughout the survey, though individual members of it changed from time to time.

We left Aden in a rather old lorry which had once been an Aden 'bus'.

Our road lay eastwards along the coast with the sea on our right hand. On our left at first lay rough desert scrub with, further inland bare sandy desert and on the skyline arid rocky hills. In some places the road passes over damp salt-covered sand. This "area of capillarity" extends in some places for more than half a mile inland. Here and there in this saline area a rough kind of sea grass grows.

After twenty miles of this, with only one small fishing village on the way, the country inland began to look greener and plantations of palm trees were seen. Here we turned sharply to the left away from the coast and entered the relatively fertile country of Abyan. This we found to be a populous district with large patches of land under cultivation and supporting many herds of sheep, goats, camels and cows. In the evening we arrived at the village of El-Qod, which has some six hundred inhabitants.

We stayed at El-Qod for the night and there we met Mr.Hartley the Protectorate Agricultural Officer who gave us some most useful information on the local crops. Which has been incorporated in the Section on Nutrition.

In the morning we found sand flies inside and mosquitoes outside our nets. These were caught and kept for future study.

Before we left a few patients were seen and one of these illustrates a difficulty we had to contend with throughout the survey i.e. the difficulty of seeing and examining women. This man wanted medicine for his wife, but, according to Arab custom, refrained from saying so. He described the symptoms as though they were his own. I gave him some medicine and said "you might as well let me see you take the first dose." He hesitated a moment and then out of a sense of mistaken politeness took two pills saying "but you know they are really for my wife".

From these early morning patients we got some information about the diet of the Abyan district.

We left El-Qod at 9.45 a.m. For an hour the journey lay through good fertile country especially populous about Zinzibar but soon we were back into the desert and again saw these areas of capillarity. We arrived in Shuqra at 1 p.m. to find that no preparation had been made for our reception. After waiting for over an hour in the midday sun outside the old guest house we drove out of the village to the Sultan's new palace about a mile inland. Before reaching it we were stopped by a soldier who bade us return. Finally we were received, back in Shuqra, in a little house. Villagers who called on us indicated that the Sultan had a grudge against the Aden government and so explained away his less than cordial reception.

(a) Shuqra

On our first day in the Fadhli capital a few sick people came for treatment and, as we did not know what facilities for the survey we were to have from the Sultan, we took each case through a complete examination and in this way completed our first ten cards. (A facsimile of the cards used will be found in Appendix I.) The Sultan himself paid us a brief visit that afternoon and, though his manner was rather abrupt, he promised help and indicated that the survey might proceed.

During our stay in Shuqra we were greatly helped by our trained dispenser there. He was one of the first to be trained at Sheikh Othman under the Tribal Dispensers Training Scheme. (See Section IV). But for his help and tact our survey in the Fadhli country would have been even less productive than it was.

After the Sultan had left us, on that first afternoon, we went for a walk with the dispenser and got a general idea of the layout of Shuqra and district. We found that the settlement consists really of four separate villages, three on the sea shore and one about a mile inland. The three on the sea shore from east to west are Bundar, Shuqra, and Qod Ambar. The fourth, which lies inland from Qod Ambar is Haft es Sadat.

Shuqra proper is much the largest of the four and is dignified by one or two big buildings. These are the residences of the Sultan and his relatives, the main mosque of the district and the school.

Apart from the houses of the Sultans* the houses of Shuqra are mostly single storeyed mud-bricks or brushwood buildings.

Along the sea front and facing the sea at the western end of the village is a row of shops. From the shop doors a twenty yard stretch of sand runs down to the water's edge at flood tide. Beached on the shore here we saw some fifteen to twenty fishing boats with men sitting alongside repairing sails and mending nets for the next day's outing.

Bundar. Immediately east of Shuqra a little creek marks the entrance of Wadi Hathwen to the sea and this creek separates the village of Bundar from Shuqra. Bundar is a poor village entirely built of unplastered brushwood. Although these huts were very poor, some were well kept and were swept clean and their walls were decorated with mats and palm leaf trays.

To Bundar camel caravans bring loads of firewood from the interior and the people of Bundar see to its shipment to Aden by sea. They also collect firewood themselves from the scrubby bushes of the plain and from the Wadi bed, where it is deposited by the flood waters.

In addition to their wood-gathering the people of Bundar have also a few lime kilns, where lime from coral and sea shells is made. Thirty years ago Bundar was the centre of a salt-producing industry, and ruins of the salt-water channels from the sea to the derelict Bundar salt pans can still be seen.

Qod Ambar. To the west of Shuqra and separated from it by another dry river bed lies the village of Qod Ambar. Here the houses are also built of brushwood but they are properly plastered inside, and each house has its own courtyard. Narrow paths run between these brushwood stockades and these paths are for the most part clean and well kept though here and there the seepage from a latrine behind the stockade fouled the pathway.

Qod Ambar is the centre of the fish-curing trade of Shuqra. The methods used are described under the report on Nutrition.

In addition to its fish curing "plant" Qod Ambar has an oil press. The only colony of Jews in the Shuqra area is in Qod Ambar. These Jews are Silversmiths and are only half a dozen in number. They make the rough bangles, the dagger sheaths and handles favoured in the district.

Haft es Sadat. To the north of Qod Ambar lies the village of Haft es Sadat. This, as its name implies, is the suburb in which the Seiyids stay. These Seiyids are the noblemen of Islam and all trace their ancestry back to the Moslem prophet himself. In keeping with its nobility this village has more mudbrick and fewer brushwood houses and it has a mosque of its own. Outside the mosque is a well and a washing place for ritual ablution. In the mosque well we found thousands of Culicine larvae but the water of the washing place alongside was free. Most of the arable land behind Shuqra is owned by these Seiyids and by the Sultan and his relatives.

On our second morning in Shuqra we arranged with the local dispenser that we would see patients in his dispensary, which is in the row of shops on the sea front.

*In any territory ruled over by a Sultan he is referred to as "The" Sultan. His nearer relatives, especially his brothers and sons also receive the courtesy title of Sultan and are referred to as "Sultan Ali", "Sultan Abdulla" &c. as the case may be.

When we arrived there with our equipment we found his place shut and were told that he had gone to see the Sultan. Later in the day, when we got the dispenser alone for awhile, he told us that the Sultan had decreed that anyone who came to us for treatment would be punished. This was verified soon afterwards by the relative of a patient we had seen the day before. This man came to us in great secrecy, for his friend's medicine and asked us not to visit the patient again as the Sultan would punish them if we did.

We abandoned the idea of seeing patients that morning and went to inspect a foul water hole which we had noticed at the north-west corner of Shuqra. From this pool we collected many mosquito larvae. The separating out of the larvae and the setting of some pupae to hatch out kept us busy for the afternoon and later a letter was composed in Arabic to the Sultan. In this a definite request was made to be allowed to examine the school children.

On our third morning we learned that the letter had been well received and that we would be allowed to see the school children next day, so we spent that day too in general studies.

First we visited the fields behind the village to see what crops were being grown. We found qasab. Qasab is any grain but principally millet, which is grown not only for its corn, but so that its green leaves and stalks may be used as fodder. Dried millet straw after the grain has been garnered is also called qasab. We also found finger millet, tomatoes, radishes and ladies' fingers. In a grove of trees near the Sultan's out-of-town house we found plots of cotton, henna and baydhan (Indian Almond) as well as a few date palms. Later we re-visited the water hole from which we had taken larvae. We were especially interested in it as it was the only spot in which we had found anophelines breeding. We caught more pupae and took them home to hatch.

We spent our fourth day in Shuqra examining the boys of the local school. Except in the case of the very small boys all were taken through the whole of the first two sections of the case card. Specimens were taken from each boy for the laboratory examinations which were done later in the day. A most valuable piece of "equipment" throughout the whole of the survey was a tin of boiled sweets. A "bribe" of a sweet made the examination of children relatively easy. We saw twenty children in each of the morning and afternoon sessions.

Next day was Friday, the Moslem holiday. As there was no school we set out to examine the water supply of the district. For drinking water all four villages depend on the main well some eight hundred yards inland from Shuqra. In Shuqra, Qod Ambar, and Haft es Sadat there are smaller wells whose water is used for washing and sometimes for cooking. Bundar has no well of its own. We found no mosquito larvae in any of the used wells, except the one at the mosque at Haft es Sadat. Whether there are mosquitoes breeding in the mosque washing-place of Shuqra itself we could not say, for there it is inside the mosque which we did not enter.

On the Saturday we had hoped to see more schoolboys but we were told quite firmly that we had seen them all and a very broad hint was given that it was time we moved on. However the dispenser asked us to come and see his house and we made this an opportunity for getting material for the housing report. His is a good middle class house and he fully co-operated with us in drawing plans of it. We inspected several neighbours' houses, and asked various questions about those who stayed there. This last activity was our final undoing, at least it was made the excuse for our dismissal. In the evening a special emissary came to see us. He was accompanied by Sheikh Abdulla, the Sultan's secretary. They said that information had reached the Sultan that we measured peoples houses, asked how many people stayed there and did many other things "which had no relation to medicine." The Sultan wanted to know if this was true and if it was true that we did such things in Shuqra under his very nose, so to speak, what would we do if we were further away? An attempt was made to explain and a plea entered for trust, on the ground that we were doctors and worked according to the methods of our profession and that many of these methods would quite naturally be new to the people of the country.

However that was virtually the end of the Fadhli survey for although we set off for Abyan next day with a promise from the Sultan that we could stay at Zinzibar and conduct a survey there, we found on our arrival at Zinzibar that no orders had been given for our reception. In fact, the people had been warned to have no dealings with us. We drove on to Qod hoping that Mr. Hartley would be able to help us to see some of the people in that village. However we found that he too had left because he had found it impossible to stay on in Fadhli country with any hope of doing useful work. We then decided that it would be a waste of time to stay longer and we drove on to Aden

1. The Examination of the People

On account of the unsatisfactory nature of the survey as related in the narrative only 55 people in a population of about 1,000 were actually examined. By age groups they were as follows:-

Age	Males	Females
2-10	38	-
10-15	6	-
15-45	7	3
45 -	1	-
	52	3

The results of the examination of these 52 males and 3 females are set out below.
Principal Occupations - Soldiers, fishermen, woodcutters and servants of the Sultan.

Standard of Intelligence and Literacy
Intelligence. Good 25. Fair 30.
Literacy. 31/55. This is abnormally high for Arabia and is accounted for by the preponderance of school boys (40 in number) among those examined. 1 Male only in the groups over 15 could read and write "a little".
Cleanliness. Head. Fairly clean throughout.
Body. " " "
Clothes. For the most part rather dirty. The returns mostly concern the male section of the populace. The habit amongst the Fadhli women of dressing the hair with rancid butter would modify opinion of their cleanliness.
General Physique. Satisfactory 24/51. Less Satisfactory 19/51. Poor 8/51.
On the whole the muscular condition is fairly good.
Rickets. Under 10. 4/38.
10 to 15. 2/6.
Teeth and Gums. Teeth good throughout.
Gums. 12/36 spongy; 7/36 gingivitis; 17/36 healthy.
Other signs of dietary deficiency. Nightblindness 1/55.
Eye conditions. Trachoma. 38/52 made up thus Tr.I.34. Tr.II.4. These were nearly all school boys. Cataract, blindness in one eye, strabismus and pigmented sclera, of each one case. (See Trachoma report).
Heart conditions. Nothing abnormal noted.
Lung conditions. Pulmonary tuberculosis 2 adults (one over, and one under 45).
Bone conditions. Nil.
Skin Conditions. Favus capitis, 1. Yemen ulcer, 2. Bahaq, 2. Septic spots, 6.
Evidences of Malaria. Enlarged spleen, 1 (A boy in the 10 - 15 group; size of spleen 3 fingers). Blood examinations, Nil. Clinical case, 1 (a motor driver).
Vaccinal State. 3/53 Vaccinated.
Anaemia. Hb below 60%, 4; 60-80%, 21; over 80%, 24. Average 82.5%.
Evidences of Bilharziasis. Nil.
Infant Mortality &c. Insufficient data.
Deformities. 1 (six fingers on one hand).
Other conditions. Gonorrhoea, 3. Mycetoma, 1. Generalised joint pains, 1.

2. Nutrition

Physique. Not quite satisfactory.
Diet. The principal food is bread made from millet. Red 'Huva' is available from January to June and Bulrush millet from October to December. In the intervening months stores from previous years are used.
Consumption of Meat, very little indeed.
" " fish, daily. An adult will eat about ½ lb.
" " milk, very little, entirely from goats.
" " salt, adequate.
" " vegetables, white radishes and radish tops regularly.
Tinned Tomatoes quite often; fresh tomatoes are available but are rarely eaten.
Meals are usually taken three times a day at 6.30 a.m. at noon and at 7 p.m. Fishermen take their midday meal at any time between 11 a.m. and 3 p.m. depending on the tides.

Other remarks. Children are usually kept on the breast until they are three years old, or even longer, unless the mother becomes pregnant.

Discussion. The people may be said to live on bread and fish. The examination of the people although inadequate has some importance because of the high percentage of schoolchildren seen. The examination revealed the presence of rickets, spongy gums and night blindness.

The occurrence of rickets may be due to the long period during which the children are breast fed. Even although the mothers get reasonably good food they get no direct sunlight. In accordance with Moslem custom the women are for the most part kept indoors. When they do come out they are so veiled and draped that no sunlight can reach their skin.

The diet would seem to be especially lacking in vitamin C and this might explain the occurrence of spongy gums. A general vitamin deficiency would seem to be indicated by the relatively large number of cases of non-infective skin disease. Even in a fish eating community a possible lack of vitamin A must be remembered.

3. Water Supply

Source. One well about half a mile inland from Shuqra supplies all four villages with drinking water.

Washing water wells exist in Haft es Sadat, Qod-el-Ambar and in Shuqra itself. There are no wells in Bundar. Of the seven such wells in Shuqra three are foul. One of these is derelict and should be filled in. The wells at Haft es Sadat and Qod-el-Ambar were fairly clean, except the Mosque well at Haft es Sadat.

Accessibility of Source. Washing water is fairly accessible except in Bundar. Drinking water has to be carried for distances varying from a quarter to one mile. Water is hand-drawn and usually carried in old petrol tins. This work is done by women. There is no charge for the water and a woman can be hired to draw and fetch one tin of water daily for four annas per month.

Protection of Wells. Main well - used for drinking water - 13 ft. to water surface - Water 2 ft. deep (at time of survey) - shaft well built and lined with stone, and plastered with cement and lime. Well wall 1 ft. thick - Well top built up 2 ft. Plinth sloped and cemented for 3 ft. all round. Puddles extend (all round well) for 10 ft. On S. and E. sides as far as 40 ft. Some grass grows in the puddles in spite of their being foul with soapy water. Washing of clothes &c. is done in these puddles.

The well mouths of the smaller wells are flush with the ground and quite unprotected. The shafts are stone-lined but not plastered.

Contamination of Wells. There is very little apparent contamination of the main drinking water well. Washing water wells are grossly contaminated. This is important in the case of those used for ritual prayer as at Haft es Sadat. This well is 14½ ft. deep and had 6 ft. of water in it at the time of examination. The mosque washing place is beside the well and eighteen stone steps lead down to it. The well was alive with culicine larvae but there were none in the washing place - probably because it was so foul. We thought that the washing place was being used as a latrine as well as for washing, but this was denied.

Nearer the sea the wells are shallower (about 10 ft.) and in several cases their mouths are only about 2 ft. across. Their water is said to be brackish. Most of them are adequately lined, and when used regularly are free from mosquito larvae.

Danger of contamination. The main well has pools around it which are for washing clothes, but these are at some distance and would only constitute a danger if there was a break in the shaft or if flood water washed the contents of these pools into the well. Foul material, however, can easily be carried into the well by wind and especially during sand storms.

Water used and available. A household of six people used four tins (sixteen gallons) per day. The amount available seems not to be seriously limited.

Discussion. The lining of the wells is good. Gross contamination, amounting to nuisance, only exists where wells are derelict (as at the N.W. corner of Shuqra) and in mosques where the bathing pool beside the well has no outlet and is almost certainly used as a latrine as well as for washing (Haft es Sadat).

Bearing in mind that part of the Moslem prayer ritual is to wash out the mouth before washing the rest of the body and that the face, eyes and ears of the worshipper are bathed in this contaminated fluid, this washing place must be regarded as a place of considerable danger.

The two most needed reforms in the water supply at Shuqra are the filling in of derelict wells and the improvement of washing facilities at the mosques.

4. Sanitation

Disposal of domestic dry refuse and trade refuse. There is no systematic refuse disposal, but habit and custom have led to the growth of large rubbish dumps at the rear of the houses. In one open space there are no fewer than twelve large rubbish dumps. During our visit these were quite dry and almost inoffensive.

Disposal of Excreta. In houses of two or more storeys (i.e. in mud brick houses) the "long-drop" system is in use. In this system the faeces are received in a "reception chamber", while the urine passes down a gutter in the wall and so to the street or the courtyard below. (See page 100).

In single storey houses and in all brushwood houses a corner of the courtyard is shut off and used as a latrine. The solids accumulate but the urine seeps through the ground and may pollute the neighbouring thoroughfare or alley.

Final disposal of Excreta. For the most part this is left to natural disintegration, but some people make a habit of having the "reception chamber" of their long drop system cleaned out twice a year. In the smaller houses the accumulated solids are raked out when necessary. In either case the final disposal is to one or other of the common rubbish dumps, where the sun and the wind complete the disposal.

Public Conveniences. In the precincts of the mosques, beside the washing places, there are conveniences for urinating; we had reason to suspect that these were sometimes used for defaecating as well. Apart from man-made conveniences, every sheltered corner of a rubbish heap, every ruin of a wall, every bush and sand hill may be so used.

Discussion. The lack of properly controlled sanitation gives rise to considerable nuisance.

i. From the rubbish heaps. In dry weather if there is any wind an unpleasant dust from the rubbish heaps is blown about getting into one's eyes, ears, nose and mouth. While, owing to the action of the sun, this has no foul smell in dry weather and may be relatively sterile, it is objectionable. In wet weather, which is not very common, the rubbish heaps are said to be a source of nuisance and must also be a source of danger.

ii. From the open latrines of single storeyed houses. These smell badly and are fly infested.

iii. From the reception chamber of a house with a long drop system. On general grounds this system is better than any other in present use in the country. A distinctive aroma pervades a house in which this system is installed and to those not accustomed to it this must be admitted to be a nuisance: it is not much noticed by those accustomed to it. The reception chamber makes a feeding ground for flies.

Immediate improvement might be effected if the rubbish heaps were regularly destroyed by fire (as at Haski, q.v.) and if the lower outlet of the long drop reception chamber (see photo on page 100) were bricked up. The bricks should be easily removable so that the chamber can be cleaned out regularly.

Other and more sweeping improvements could be undertaken after educating the people and their rulers in elementary hygiene.

5. Special investigations relating to Malaria

General. The investigation covers a series of four villages with a total population of a thousand. The general economic status of the people is just above subsistence level. The villages are situated on the main caravan routes from Beihan, Lodar, Dathina, and Ardh el Hasana to Aden and Ahwar. Shuqra is also a motor terminus from Aden. Dhows call at Shuqra from Aden and Mukalla.

Use of Quinine. Nil.

Presence of Mosquitoes. The Anophelines caught at Shuqra, reared from pupae at Shuqra and caught at El-Qod were all A. gambiae.

The Culicines were C. fatigans and C. sitiens. The permanent breeding places found at Shuqra were:- Anopheline, a stagnant waterhole at the N.W. corner of Shuqra which is a derelict well. Culicine, as for Anopheline and the mosque well at Haft es Sadat. When the wadi is in flood the many resulting pools will give mosquitoes a better chance to breed. The puddles about the main well may be considered as potential breeding places. The fact that no larvae were found in the house water pots is probably due to the habit of stuffing a piece of brushwood into the waterpot mouth. This prevents the access of mosquitoes to lay their eggs.

Discussion. The permanent breeding places found could very easily be dealt with, especially the stagnant pool where the water is only some 3" deep. The hole in all is only 3 ft. deep and about the same in diameter.

6. Housing

Materials used in building

The two main types of house are of mudbrick and brushwood respectively.

Mudbrick - The building materials are sun-dried mud brick in which tamarisk straw is used as the binding material. This is used for the walls. The roofs and ceilings are of roughly trimmed branches of trees used as beams and "filled" with brushwood. These are plastered on the upper side only.

Brushwood - In this type of house there are two or even three grades. In the best of the brushwood houses the walls are of brushwood and the roofs supported by stout branches are of the same materials as in the mudbrick houses. The walls are plastered on the inside. In the next grade the walls are unplastered and the roofs are of palm leaf matting. In the poorest class of house the brushwood is very loosely put together and the house is little more than a shelter.

These houses, like the single storey mud brick houses, are usually surrounded by a brushwood stockade.

Of the 52 people questioned 10 lived in brushwood, 21 in single storey, and 21 in two or more storey mud brick houses.

Average number of rooms per house:-

Poorer class 1-3, Wealthier class 4-6.

Size of sleeping rooms:-

16' x 8' x 7' for 3 persons but often there are 4 to 6 in such a room.

No rooms are kept for sleeping only; they are living rooms in the day time.

There is little difference in the sleeping accommodation in different classes. In the poorer houses the rooms may have to hold more people but in all classes the average number per sleeping room was between 3 and 5.

Ventilation. The door only in brushwood houses. Mudbrick houses have small windows (see diagrams.)*

Presence of livestock. These are usually kept in the courtyard. Chickens predominate. There are not many sheep and goats and there are no cows. There are a few dogs and many cats.

In two storey and larger houses no people live on the ground floor and it may be used for live stock (see diagram 1).*

Comment. It will be clear from these notes and diagrams* that the possession of a larger house does not mean that more or better sleeping space is used by the occupants. It is the custom for the household to have one main room which is used both as a living room and a sleeping room. Even where the house has two storeys, as in Plan 1*, the extra space is wasted or used merely for stores or livestock.

On the other hand the mudbrick houses have flat roofs and in hot weather people sleep on the roofs. Again, in houses of brushwood, people may sleep in the open air inside the stockade.

*Not reproduced.

(b) Abyhan

1. The Examination of the People

Two villages were visited, namely Zinzibar and Museimir, and 87 unselected cases were seen as follows:

Museimir

Ages	0-1	0.
	1-2	2 Males
	2-10	12 Males and 1 female.
	10-15	7 Males.
	15-45	8 Males and 7 females.
	over 45	1 Male.

i.e. 31 Males and 8 females.

Zinzibar

Ages	0-1	0.
	1-2	0.
	2-10	21 Males.
	10-15	8 Males and 1 female.
	15-45	16 Males.
	over 45	2 Males.

i.e. 47 Males and 1 female.

Principal Occupation. Half of the adult males are land workers. Of the others camelmen, fishermen and shopkeepers occured in about equal numbers. There was one Jewish silversmith.

Standard of Intelligence. One mentally defective person was found in Museimir - otherwise intelligence was good.

Literacy. Two Arabs and one Jew in Zinzibar said they were literate.

Cleanliness. Conditions in the two villages were much the same. Many of the younger children are quite naked and even the adult men often wear only a loin cloth:-

Cleanliness of	Head	Body	Clothing
Good	11	10	9
Fair	36	34	30
Poor	0	0	0

General Physique. Satisfactory 19
Less " 24
Poor " 4

Rickets. 1 child aged 1-2 (Museimir)
4 children aged 2-10 (Zinzibar)

In all, 37 children under 10 were seen, the incidence of rickets is therefore 5/37.

Teeth and Gums. Of fifty cases examined:-

10 had irregularly erupted teeth.
2 " chalky teeth.
and 22 " spongy gums.

Eyes conditions. Acute Conjunctivitis: 7 in Zinzibar.
3 in Museimir.
Chronic Conjunctivitis 1 in Zinzibar.
Cataract 3 in Zinzibar.
Blind in one eye 3 in Zinzibar.
Corneal ulcer 1 " "
Blepharitis 2 in Museimir.

Trachoma. Trachoma I, 9 in Zinzibar, 4 in Museimir.
Trachoma II, 13 in Zinzibar, 7 in Museimir.

i.e. 33/86. Of these 22 were below 10 years of age.

Lung Conditions. 8 cases of cough were seen. Of these 4 had haemoptysis, and of these 3 were taken to be pulmonary tuberculosis. The history of the fourth case was short and there were no diagnostic signs in his chest.

Heart Conditions. 2 cases were seen which suggested cardiac insufficiency; of these one had also oedema of the legs and the other a definite cardiac enlargement.

Bone and Joint Conditions. 2 cases of bullet wound. One causing ankylosis of the elbow and the other of the knee.

Deformities etc. Six fingers in each hand; lipoma of skin; depressed bridge of the nose (syphilis); ventral hernia; congenital dislocation of the hip; spinal tuberculosis; scoliosis; juxta articular nodes of elbows and fingers (Probably bejel).

Skin Conditions. Prickly heat 8; bahaq 3; septic spots 2; ulcer of Arm 1; ulcer of leg 2; pruritis 1; ringworm 1; leprosy 2.

Evidences of Malaria. Of 21 children in the 2-10 group in Zinzibar -
15 (71%) had large spleens.
Of 11 children in the 2-10 group in Museimir
6 (55%) had large spleens.
The splenic index taking the two villages together was 66.
The average enlarged spleen extended to 2.3 finger breadths below the costal margin.
Three cases of extreme anaemia were seen in Zinzibar.

Vaccinal State. Of 72 persons -
10 were vaccinated.
7 had had smallpox.
55 were not vaccinated.

Infant Mortality. Of the seven adult women seen all belonged to Museimir. Six were questioned about their children and the following figures compiled from their answers:-
Of 6 females between 15-45, 5 were married
Marriage Rate 83%.
30 children had been born alive to 3 of the 6 women; this gives a fertility rate of 5, and a married fertility rate of 6.
Of 30 children born alive 7 had died in infancy.
Infant Mortality Rate 233.
Of 30 children born alive 17 had died before the age of 5 years.
Child Mortality Rate 566.

Prevalent Morbid Conditions:-

Fever (presumably Malaria)	5	Leprosy	2
Pulmonary Tuberculosis	3	Conjunctivitis	2
Undiagnosed Cough	5	Tropical Ulcer	3
Neuritis	1	Pruritus	1
Rheumatism	1	Cardiac oedema	1
Diarrhoea	1		
Constipation	1		

Comment. This rather hurried examination of a few people in the very populous Abyen area indicates:-
(i) Malarial hyperendemicity.
(ii) A high incidence of trachoma especially in children under 10.
(iii) A nidus of open and probably very infective pulmonary tuberculosis and
(iv) A nidus of leprosy, in the Abyen area.

2. Nutrition

The general appearance of the people as regards physique and nutrition is fairly satisfactory.
The staple diet is red and white millet (Sorghum vulgare). It is used in the form of bread or as a thick porridge.

Consumption of

Meat: Very occasional. Two persons gave it as a regular article of diet; of these one said he had meat once a week and the other once a fortnight.

Fish: A daily ingredient. About 1 lb. daily. When the weather is bad and there is no fishing the people eat from stores of salted fish which is often maggoty.

Milk: Nearly every one has some and a good supply is available; the average amount of milk plus buttermilk drunk seems to be ½ pint daily.

Vegetables: Available for 6 months in the year, but always eaten cooked. Radish, tomato, "Ladies Fingers" and egg plant are available.

Fruit: Bananas and guavas in the season.

Meals are taken three times a day.

Comment. The available food seems to be fairly good but the incidence of rickets (5/37) and the prevalence of spongy gums (22/50) indicates a need for some reforms in diet.
The people might be encouraged to eat some of their vegetables - especially tomatoes - raw and to drink more milk. Instruction is needed in maternity and child welfare.

3. Water Supply

Zinzibar. The village well is beside the Mosque. It is 20 feet deep to the water surface and the water in the well at the time of the survey was 3 feet deep.
The well is lined with large rounded stones and is not plastered.
The well head is 5 feet in diameter and is surrounded by unpleasant black mud. The surface of the ground into which the well is sunk slopes to the south so that the ground level to the north of the well is higher than the well head. For ten yards to the south of the well the ground is puddled. The well head is not raised and water runs back into it. The water is hand drawn - it is not clear but is said to be quite sweet.

Museimir. The well is sunk in firm sand and is not lined with stones and is not plastered. It is 20 feet deep to the water and had 1 foot of water in it at the time of the survey. The bottom part of the well - that part in which the water lies and a few feet above - is framed with palm leaf. The well head is slightly raised above the general ground level - it is square in shape with 6-foot sides.
The water is hand drawn in leathern buckets and is muddy.
In both villages the drawing of water is done by the women.

Comment. The water supply seems to be adequate but the wells are very unsatisfactory from the hygienic point of view.

4. Sanitation

Disposal of domestic dry refuse, etc. Rubbish heaps 10-12 feet high are scattered irregularly in the villages.

Disposal of Excreta. Women use a corner of the house wash-place in the court-yard for defaecation. At night the faeces are gathered up and deposited on the nearest rubbish heap. Males go to any spot of reasonable solitude.

5. Special Investigations relating to Malaria

General. The two villages visited may be taken as representative of the cultivated belt in the Fadhli tribal area. The general economic status of the people is just above the subsistence level. The villages were both near the river bed of Wadi Bana.

Presence of Mosquitoes. Three adult anopheline mosquitoes were caught and all are believed to be Anopheles Gambiae.

6. Housing

There are two kinds of house in these villages - mudbrick and brushwood.
The average number of occupants per room in these houses was 2,3.
The main fault of the houses is the entire absence of sanitary accommodation.

The 'Abdali Tribal District (See Map)

After our experiences in the Fadhli country we were glad to be able to take for our next survey a country definitely known to be friendly.

On December 26th we interviewed the 'Abdali Sultan, H.H. Sir Abdulkarim Fadhl, who happened to be that day at his Aden residence. With him we discussed the best places at which to conduct the survey. We indicated a preference for a village in the fertile area where the river runs all the year round and another in the drier, sandy part of the country.

For the first of these the Sultan granted us the use of one of his guest houses north of Lahej and assured us that there were several villages within easy reach of it. For the second part of the survey he promised to try to get for us the use of a house between El-Waht and Mehilla in the more desert part of the 'Abdali territory.

The 'Abdali Sultan is the most progressive of the rulers in the Protectorate and exerts a beneficient influence far beyond the border of his own sultanate. As we have already mentioned in the introduction he started a medical department of his own as far back as 1931. This department consists of a dispensary in Lahej staffed by an Indian doctor and an Arab dispenser. We are very grateful to H.H. the Sultan for releasing his dispenser and allowing him to accompany us during the whole of the 'Abdali survey.

Geography of 'Abdali Country

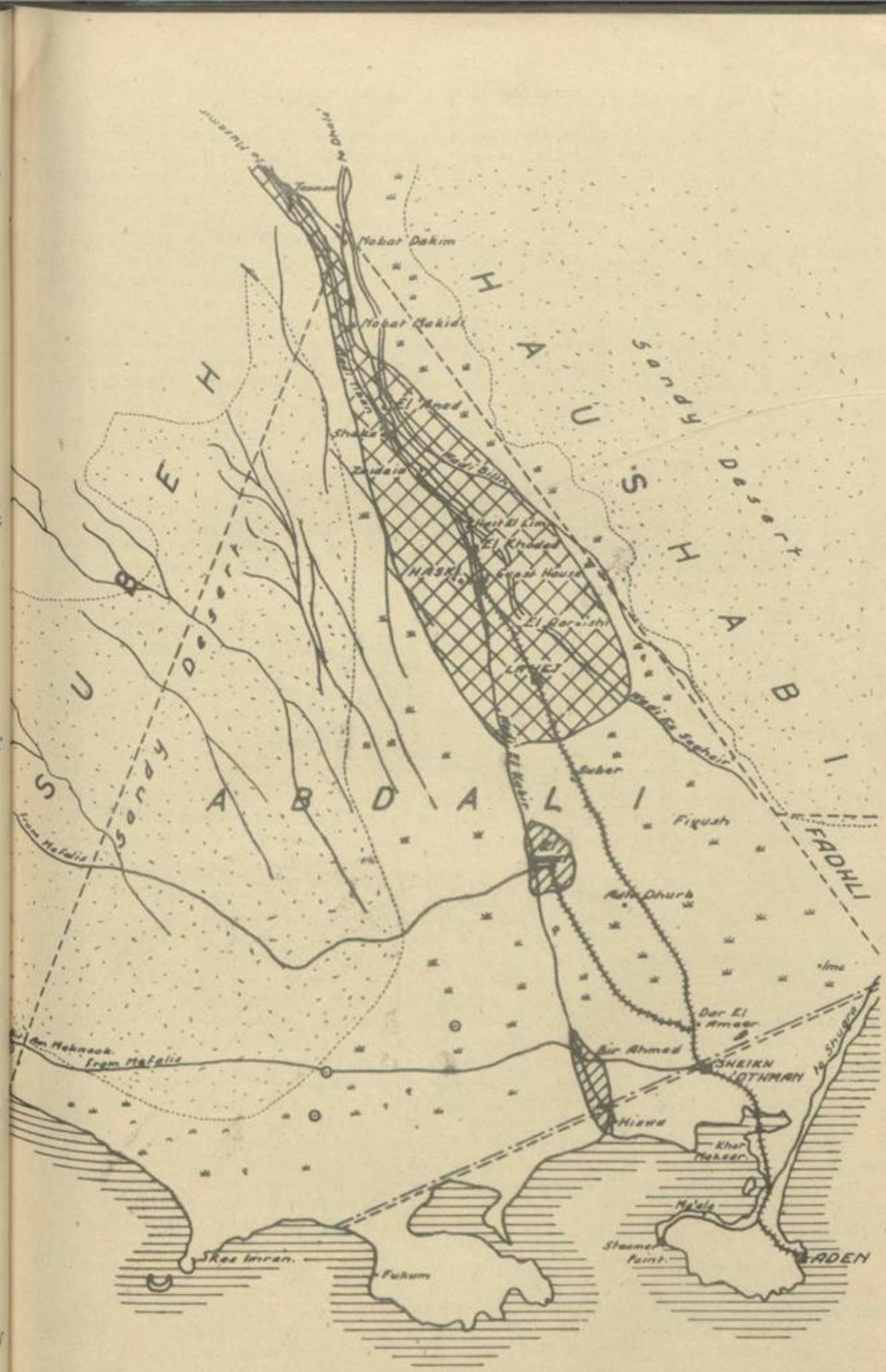
Geographically the 'Abdali tribal area may be likened to an equilateral triangle with two angles on the coast and one inland. (see map). The landward angle lies at Nobat Dukeim while the angles on the coast are respectively near Biran Makhnuq Makhnook to the west and near El Inad to the east. The sides of the triangle are about thirty miles long. The coast, however, is not a straight line but juts to the south and the distance from Aden to Nobat Dukeim is about forty miles. Most of this southward jutting part goes to form the colony of Aden and does not come under the 'Abdali jurisdiction.

Entering the 'Abdali triangle at its northern angle is the Wadi Tiban. For the first twelve miles of its course in 'Abdali territory this river runs on a line roughly corresponding to the bisector of the upper angle. At Hait el Lin the Wadi forks into the two branches which forms its delta. These are called the Wadi el Kabir and the Wadi es Sagheir. The main stream and the upper eight miles or so of these two forks are perennial. The area so watered is one of the richest and most fertile in the whole Protectorate. In this area one finds not only the usual cereal crops in plenty, but also groves of limes, guavas and bananas.

Lahej, the 'Abdali capital, lies in the centre of this fertile area. This town, with its population of 12,000, is the largest in the Western Aden Protectorate and is an important trade centre. The two main trade roads from Yemen, one from Qa'taba and Dhala' and the other from Ta'iz, meet at Nobat Dukeim and pass through Lahej on their way through the whole length of the 'Abdali country to Aden.

The river determines the three divisions into which the country naturally falls. These are the agricultural, the pastoral and desert.

(i) The Agricultural Area. This begins about El Anad in the north and follows both arms of the Wadi Tiban delta to about three miles below Lahej.



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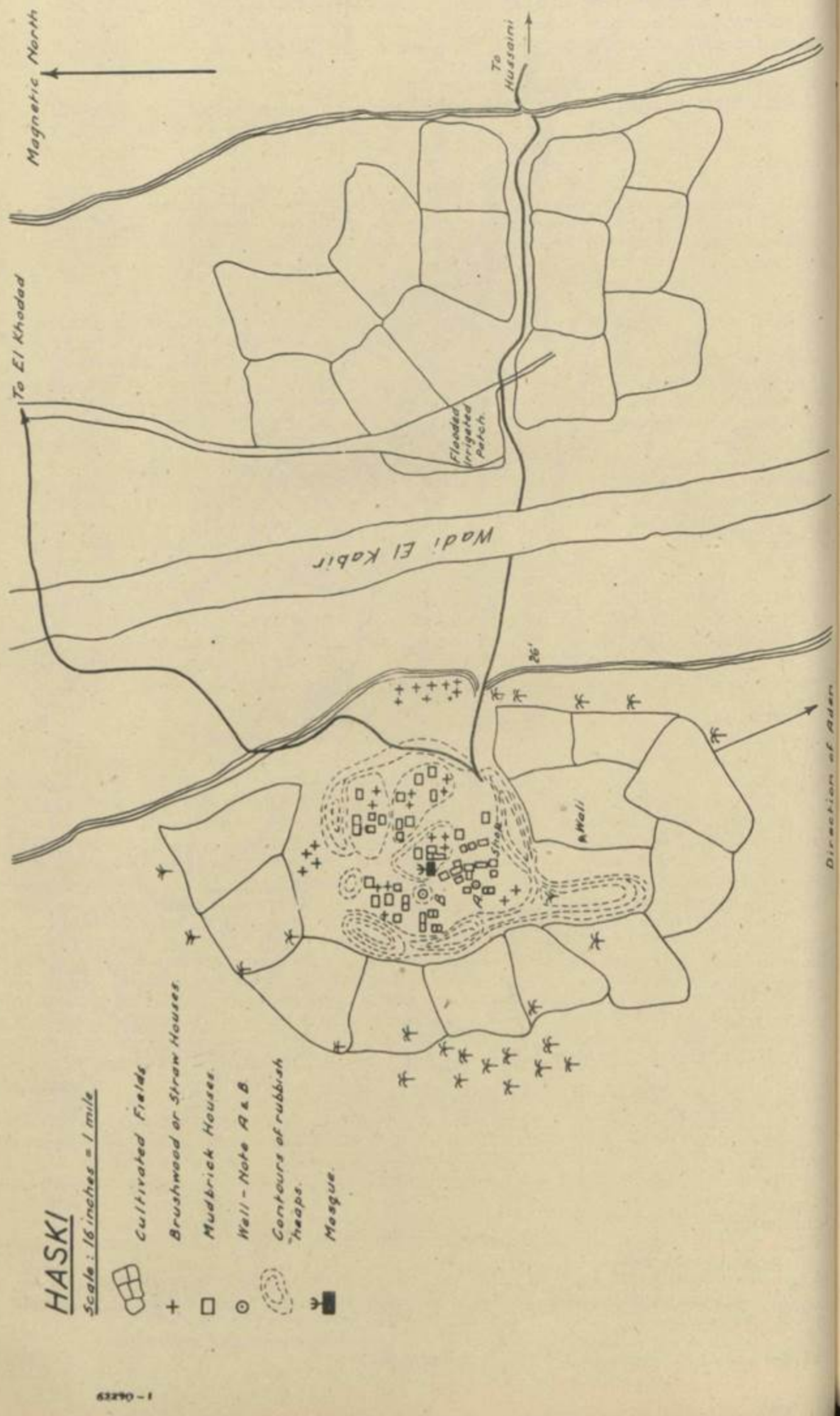

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(ii) The Pastoral Area. This lies on the outskirts of the first and in the delta continues almost to the coast. When the rains in the interior send the Wadi Tiban down in flood the two arms of the Wadi delta are filled with water and in the case of the Wadi el-Kabir this often reaches the sea at Hiswa. As a result of this seasonal inundation people in parts of the pastoral area are able to combine a certain amount of agricultural work with their flock rearing. This is the case, for example, at El Waht, Bir Ahmed and Hiswa.

(iii) The desert. The districts on both outer sides of the 'Abdali triangle are barren uninhabited desert. This is largely true of the coastline as well, even fishing villages are rare. The only 'Abdali fishing village of any importance is Ras 'Amran.

This geographical paragraph must be ended with a word of warning. The tribal boundaries as here outlined are highly simplified and represent a convention useful for the purpose of this survey. The area under 'Abdali rule is a wide one and varies from time to time. The 'Abdali Sultan has certain authority in the Sueihi and even in the Haushabi country, but these matters concern political boundaries; for our purpose, the geographical boundaries as here outlined are sufficiently accurate.

The Journey to Lahej

We left Aden about 1 p.m. on Dec. 28th. As far as Sheikh 'Othman our road was the main motor road of the Colony. At Dar el Amir we were in desert with some scattered dry scrub. Between Adh Dhurb and Subur a few flocks of sheep and goats were to be seen and a few settlements of brushwood houses. Not far beyond Subur we suddenly entered the fertile area. First we passed through fields of cotton in which a few tall date palms were growing. Past the cotton we came to fields of Gilgilan, or sesame, one of the sources of cooking oil. Then for quite a long stretch our way on both sides was bordered by fields of giant millet. Both red and white varieties were seen. We got to Lahej by 2.30 p.m. and there we were received by the Sultan at his new palace.

(a) Haski (See Map)

We discovered that the nearest village to the guest house which had been given to us by the Sultan was the village of Haski, so as soon as possible after our arrival we set out with the Sultan's dispenser and one of his soldiers to the village.

From the guest house to Haski was about a quarter of an hour's walk. Our way at first lay over fields of fine rich looking soil. After a quarter of a mile of this the ground shelved sharply down to the Wadi el Kabir. The wadi at this point is about four hundred yards across. El Haski lay on the far side of the Wadi. Cultivated fields occupied the first part of the Wadi through which we passed. Of these some were irrigated by flood water.

The west bank of the Wadi is bounded by a steep sandy cliff some twenty-six feet high. A narrow path led up a break in this cliff to the patch of cultivated ground surrounding the village. On the brink of the cliff a quantity of straw was stacked. Among this some Hajri harvesters had made straw huts for themselves.

These Hajris are a wandering, dark skinned people who engage in labouring work and are often to be found in districts where there is harvesting to be done. They are said to come from the Wadi Hajar in Hadramant about 100 yards further on we came to the village of Haski itself. Haski lies in a hollow made by its own rubbish dumps. In the centre of the village is its mosque. Some of houses are of bruskwood and others of mudbrick. The accompanying plan gives a general idea of the layout of the village.

On our first visit the chief man of the village (the 'Aql - lit. the wise man A term used generally in the Protectorate to designate a village chief, especially one who is not independent. In this case the 'Aql is appointed by the Sultan of Lahej) was not at home but we saw one of his relatives and arranged to begin the survey next morning. We asked him to see that one responsible member of each household be invited to be present to meet us when we arrived in the morning.

At 8 a.m. next morning one of us set off to walk round the village with the dispenser while the other interviewed the 'Aql and representatives of fifty-one households. We agreed later that this probably did represent each household for from a suitable eminence on one of the rubbish heaps fifty houses could be counted.

Each representative of a household was asked how many persons lived in his house. The total number in the fifty-one houses amounted to 258, giving an average per house of over five. The largest number in any one house was ten and the smallest number one.

A dozen houses were of brushwood and the others of mudbrick. The whole village was well stocked with goats, cattle and fowls. There were two wells in the village used only for drinking water which was said to be good and sweet; one well was covered and the other not. The perimeter of the village was just under six hundred yards.

With the 'Aql we arranged to hire a room in which to keep some of our gear and in which to see patients. The first batch of people we saw impressed us by their anaemia and general ill health. On one of our walks to and from the village we met one of the villagers who was obviously a leper and later in the day we saw a blind beggar at El-Khudad who was a leper. He however was not a native of the district. He said that he came from Zabeed. We advised him to go to the leper colony at Sheikh 'Othman. This man is not included in the statistics of the Haski survey.

For the next few days the survey proceeded according to plan. We saw the inhabitants, took laboratory specimens, examined houses, measured wells, caught mosquitoes and did all the things we had hoped to do.

At first we saw patients at the room we had rented, but one day we were taken to the house of a Seiyid where we saw two of his children who were sick. One - a girl of fourteen, had been bedridden for four years. Her bones showed marked signs of shortening and the long bones of both forearms were bent in their lower third to the likeness of a swan's neck. Her head and face seemed normal but she was barrel chested; her legs were very underdeveloped. The other child, a boy of five, was an epileptic.

After seeing these patients it was an easy matter to get permission to see the other members of the household and then of the neighbouring houses, so that in that one house we saw 23 cases. On other occasions we were able to see people in their houses and they brought in neighbours. In this way most of the adult females reported on were seen.

On the evening of January 3rd the 'Aql said that he thought we had seen all the people who were willing to be seen. By then we had seen 110 cases. Since we had estimated the population of Haski at 258 we had seen about 40 per cent. of the people so next day we arranged to go on to Waht.

1. The Examination of the People

As the 'Aql had foretold we did not see many more cases after reaching the total of 110 noted above. Actually we saw one hundred and eighteen of the people of Haski during the period of the Haski survey. Some weeks later we met a leper on the Lahaj road who told us that his home was at El Qureishi, quite near Haski. We visited El Qureishi and found two more lepers so the total number of people seen belonging to Haski and district was one hundred and twenty one.

Of the 121 cases seen 78 were males and 43 females. They belonged to the following age groups:-

Age group	Males	Females
0 - 1	1	1
1 - 2	1	
2 - 10	23	11
10 - 15	11	4
15 - 45	38	17
over 45	4	10

Occupations. 46 males and 18 females gave particulars of their employment as follows:-

	Males	Females
Landworkers	21	4
Camel keepers	12	
Shepherds	5	
Cow keepers	3	
Housewives		13
Mosque caretaker		1

Soldiers, shopkeepers, landowners, teachers and builders were each represented once.

Intelligence. Of 77 examined 60 were returned as good
16 as fair
and 1 as poor.

Literacy. The presence of a teacher in the village does not mean that there is any school in the usual sense. The teacher teaches a few children to recite the Qoran. In the whole village only five people could read and write. These were

1 boy under 10.
1 boy between 10 and 15.
and 3 men in the 15 - 45 group

None of the women was literate.

Cleanliness.

	Cleanliness of Head		Cleanliness of Body		Clothes	
	Males	Females	Males	Females	Males	Females
Good	15%	10%	12%	8%	14%	8%
Fair	75%	56%	70%	66%	49%	50%
Poor	10%	34%	18%	26%	37%	40%

The unflattering return for the heads of the women is as in Shuqra due to the habit of dressing the hair with rancid butter - the resultant plaits after a time become a sticky, smelly, muddy mass. It will be seen that the returns for clothing in both sexes are poor. The louse, and the bed-bug were commonly found.

General Physique. Our returns under this head were fairly satisfactory as may be seen by the following table:-

	Males	Females
Satisfactory	51%	50%
Less satisfactory	39%	42%
Poor	10%	8%

Conditions suggestive of defective diet.

Rickets. 9 in the 2 - 10 group
3 in the 10 - 15 group giving an incidence of 12/49.

Teeth. Teeth were on the whole good but 4 children out of 33 in the 2 - 10 group showed faulty eruption.

Gums. The condition of the gums was unsatisfactory. In 110 people examined, only 36 were classed as having healthy gums. Of the 74 with unhealthy gums
42 had spongy gums
12 had pyorrhoea
and 10 had gingivitis.

No cases of night blindness or of xerophthalmia were seen in Haski

Eye Conditions. Trachoma was present in 50 of the 109 cases examined. The following is the trachoma report by stages:-

Tr. I 27. Tr. II 8. Tr. III. 11. Tr. IV. 4.

The highest incidence of the disease was in the 2 - 10 group where 23 of the 31 examined were infected; of these, 14 were Tr. I.

Other eye conditions were represented as follows:- Cataract 4, corneal opacity 2 (one each from smallpox and trachoma), acute conjunctivitis 2 (one simple and one complicating trachoma), glaucoma, squint, pterygium, epiphora, and pinguecula were noted once each.

Visual acuity was reduced to or below FC/6 in 2 cases in one eye
in 2 cases in both eyes
was lost or reduced to or below HM in 2 cases in one eye
in 4 cases in both eyes.

This gives a total of 10 cases where visual acuity in one or both eyes was reduced to or below FC/6, and as all the eye conditions except trachoma and acute conjunctivitis were seen in persons over 15, this gives a percentage of 12 blind, or partially so, in the adult population.

Heart conditions were noted as follows:-

Enlargement, 3 males in the 15 - 45 group.
Mitral Systolic murmur, 1 male in the 15 - 45 group.

Facilities, for the examination of women's chests are limited, even in a friendly community like that of Haski.

Lung conditions were noted in ten cases in various age groups. They were as follows:- Bronchitis, 2 cases under 2 years.
Adventitious sounds at apices (? tuberculosis) 3 cases.
Clinical pulmonary tuberculosis, 1 case.
Cough, 3 cases.

Bone conditions were noted in three cases as follows:-
An adult male with bowing of the tibiae.
A child in the 2 - 10 group with enlarged epiphyses
The case of ? osteomalacia already referred to.

Deformities other than those already noted were seen in 4 cases as follows;-

1 ganglion of wrist.
1 main en griffe from Leprosy.
1 lost finger from snake bite. (see footnote)
1 deformity of lower jaw from bullet wound

Skin conditions were noted in 25 cases as follows:-

Septic spots, 13.
Yemen ulcer, 3.
Acne vulgaris, ringworm, bahaq each 2 cases.
Warts, favus capitis, and impetigo, each 1 case.

Evidences of Malaria

The spleen. Enlargement was seen in 69 of 110 cases examined. In the 2 - 10 group 32 cases were examined and 27 had enlarged spleens, a splenic index of over 84%. The details of the size of these spleens were:

7	enlarged	1	finger	below	costal	margin
10	"	2	"	"	"	"
6	"	3	"	"	2	"
4	"	4	"	"	"	"
1	"	more than 4 fingers.				

This gives an average enlarged spleen of 2 fingers.

The blood. Malaria parasites were seen in 20 of the 67 slides examined. In most cases the forms seen were small rings. In two cases rosettes were seen and in one case there were crescents. We concluded that both benign and malignant tertian malaria are hyperendemic in the area.

Haemoglobin. Anaemia was present in a large proportion of the cases examined. The actual figures were:-

Severe anaemia (Hb under 60%) 4 males, 3 females
Anaemia (Hb. 60 - 80%) 41 males, 31 females
Satisfactory (Hb. over 80%) 18 males, 3 females.

The average Hb percentage was 75.

Vaccinal State. 17 males and 3 females had been vaccinated,
6 males and 11 females had had smallpox,
43 males and 24 females were unvaccinated,
i.e. roughly 35% protection.

Examination of stools and urine

Ascaris eggs were found in 3 of 12 stools examined.
Gonococci were found in 1 urine.
No evidences of bilharziasis were found.

During our stay at Hussaini we were called out to a case of snake bite at El-Khudad. The patient was acutely ill for two days and in spite of treatment the part affected (a toe) became gangrenous and sloughed. The common snake of the district is the horned viper.

Vital Statistics. 27 females over 15 were seen and relative data were obtained from 26 of these as follows:-

of 26 females over 15, 20 had been or were married
Marriage rate 78%
to 26 females over 15, 96 children had been born alive
Fertility rate 3.7
to 20 married females over 15, 96 children had been born alive. Married fertility rate 4.8.
of 96 children born alive 18 died in infancy
Infant mortality rate 188 per 1000.
of 96 children born alive 57 died under 5 years of age.
Child mortality rate 59.4 per 1000. (see footnote)

Prevalance of morbid conditions:-

The following includes conditions already mentioned

	Males	Females	Total
Fever	41	27	68
Cough	7	3	10
Dyspepsia	4	2	6
Joint pains	1	4	5
Leprosy	2	2	4
Splenomegaly	3	1	4
Otitis media	3	-	3
Yemen ulcer	3	-	3
Loss of vision	1	2	3
Constipation	1	1	2
Bleeding gums	1	1	2

Abscess, pain in chest, dysentery, salivary fistula, epilepsy, and worm infestation afflicted 1 male each. Osteomalacia (?) conjunctivitis and pulmonary tuberculosis afflicted 1 female each.

This table summarises actual complaints made by the people examined or diagnoses based on these complaints. Nearly every person seen had some complaint - even if only for the sake of acquiring a free purgative.

Comment. The examination of the people of a representative village in the fertile part of the 'Abdali tribal district reveals:- malarial hyperendemicity, a high incidence of trachoma, a nidus of leprosy nearer Aden than was formerly suspected, a high infant mortality and a high child mortality, absence of bilharziasis in spite of the proximity of the Wadi Tiban in which the people of the village bathe and wash their clothes.

2. Nutrition

Physique. As already noted, the people are fairly satisfactorily nourished but anaemic.

Diet. The principle food is millet. It is used in the form of bread and in the form of a porridge called 'aseed. A few people also use rice.

Consumption of meat. Very little, only two people claimed to eat it regularly.
fish. Regularly - nearly every day.
milk. A good supply - usually taken unboiled.
vegetables. Tomatoes, egg-plant, and "ladies fingers" are plentiful. They are cooked with the fish and eaten with 'hulba'. They are not eaten raw. White radishes and radish tops are the only vegetables eaten raw.
fruit. Very little.
salt. Adequate.

Meals are taken three times a day.

For statistical purposes these women are divided into two groups (1) 15 to 45 and (2) over 45. The figures in the first group are the more reliable. They are: of 17 women in 15 to 45 group 11 were married: Marriage Rate 65%. To the 17 women 43 children were born alive: Fertility Rate 2.5. To the 11 married women 43 children were born alive: Married Fertility Rate 3.9. Of 43 children born alive 9 died in infancy: Infant Mortality Rate 210. Of 43 children born alive 23 died under the age of 5: Child Mortality 535.

The diet seems reasonably good, but in such a fertile country people might be encouraged to eat other cereals in addition to millet. The fish is brought from Ras Imran and is available in the market each morning. It seemed reasonably fresh.

The frequent occurrence of unhealthy gums might be relieved if people could be persuaded to eat more of their vegetables raw - especially their tomatoes.

The presence of rickets may be accounted for by inadequate calcium intake, and lack of sunlight because of the custom of keeping the women, especially nursing mothers, indoors.

Guavas, limes, bananas and other fruits are grown close at hand and are on sale in Lahej market. These would form a useful and easily obtainable addition to the dietary. In this connection it would have to be borne in mind that the eating of raw vegetables might further increase the incidence of Ascaris infestation.

3. Water

Source of Supply. Two wells in the village itself supply the people with drinking water. Washing of clothes and bathing is usually done in the river 100 yards east of the village.

Accessibility of Source. The wells are easily accessible to the whole village. The one marked A is 45 ft. deep to the water and had 9 ft. of water in it at the time of our visit. The well marked B is 43 ft. deep to the water and had 9 ft. of water in it at the time of our visit.

The river is somewhat less accessible and varies with the season. This may be a factor in determining the poor standard of cleanliness in the village.

Protection of Source. Well A. Shaft stone-lined and cemented. Well head, a dome-shaped, well-cemented structure completely encloses the top of the well and leaves only a circular opening for the lowering of buckets. This opening is 1 ft. in diameter. The dome is 3 ft. high and in addition to the circular opening just mentioned has a small wooden door 1 ft. 4" x 2 ft. at its base. Through this door also water may be drawn; the door is kept shut when not in use.

Well B. Shaft stone-lined and cemented. The well mouth, 4 ft. in diameter, is unprotected. The well head is raised above the general level of the surrounding ground by 2½ ft. The slope from the well head to the general ground level is cobbled and is 10 ft. in width.

Danger of contamination. Well A. Contamination may be carried in by unclean buckets. The cemented courtyard in which this well is situated is used largely by sheep, goats and cows. Any crack in the cement might lead to gross contamination.

Well B. In some seasons of the year the wind-blown refuse makes the village folks miserable and must cause considerable contamination of this open well. Cattle come to drink once a day from the puddles formed in the cobbles around the well and a crack in the well shaft might at any time lead to gross contamination.

The river is grossly contaminated and its use for washing adds to this. This is a matter of importance as the river water is used for ritual ablution.

Water used and available. A family of three was found to use 12 gals. per day from the wells i.e. 4 gals. per head per day. At some seasons of the year the Sultan may divert the water in the river for irrigation purposes. At such times twice as much water is taken from the wells i.e. for all purposes 8 gals. per head per day. The amount of water available seems always to be adequate to the demands put upon it.

The water supply is adequate and the wells fairly satisfactory. Contamination could be mitigated by a better system of refuse disposal (see under Sanitation). No mosquito larvae were found breeding in the household water pots or wells.

4. Sanitation

Disposal of Domestic Dry Refuse and Trade Refuse. The whole village, except for a small area to the north, is surrounded by great rubbish dumps. These are higher than the houses and in two places are nearly as high as the mosque minaret. Periodically these dumps are set on fire and they burn easily, since a great part of their bulk is formed by dry straw. The ash resulting from these periodic burnings is soft and powdery and is easily blown about by the wind. Walking over these heaps the feet sink for three or four inches into the ash.

Disposal of Excreta. Normally no provision is made in the houses for the reception of excreta. Not very far from each house there are usually some stacks of straw. Women use the centres of these stacks for defaecation. Otherwise people go out among the bushes. In special circumstances, as when anyone is too sick to go out, a corner of the courtyard may be screened off for a latrine.

Defaecation also takes place in the open fields, or holes in the ground may be used. The use of open fields in this connection is important in relation to Ascaris infection and would have to be remembered in any campaign to persuade the people to eat their vegetables raw.

Final disposal of Excreta. Mostly by natural disintegration aided by the sun, wind and rain.

In spite of the entire lack of sanitary provision in houses there was surprisingly little nuisance but in the wet weather there must be more, and then also considerable danger. During the months of the monsoon when the winds are high the dust blown into the village covers everything. Much of this is sterile ash from the "incinerated" rubbish heaps but there must also be much dangerous material from drying excreta.

In the present state of development it is difficult to suggest any simple improvements. Education might encourage the people to leave fields in which vegetables are grown free from excreta. The rubbish heaps should be further from the houses and simple bore-hole latrines might be introduced if this could be done without danger to the wells. (See also note on Lahej Sanitation Appendix II).

Special investigations relating to Malaria

General. The village in which the survey took place is a representative village of one of the most thickly populated areas in the Protectorate.

The population was estimated by interrogation of the head of each family and checked by counting the houses in the village and multiplying by the average per house. The figure thus found was 260.

The people are almost entirely employed in agricultural and pastoral work. They all belong to the village and we only heard of one recent immigrant.

The people have almost no financial resources but their economic status is fairly good as regards food and stock. Their capital resources are their stock and their fields.

The general standard of nutrition is fairly satisfactory but the general health is undermined by malaria with much resulting anaemia.

The village is one mile from the main road between Aden and the north. There is free communication with Lahej and with the neighbouring villages on the wadi. Lahej is the market town.

Quinine was not used in the village before our visit.

Mosquitoes. Examination of the household water pots and of the large water pots kept at the mosque for ritual ablution failed to reveal any breeding places. Adult mosquitoes were sent home for identification and pupae found in the guest house bathing pool were hatched out.

All specimens were identified at the London School of Hygiene and Tropical Medicine as Anopheles gambiae. The finding of pupae and larvae in the guest house bathing pool suggests that any stagnant water might become a breeding place. The people of the village strengthened this view by saying that in the season when the fields are flooded, spring, the place is infested with mosquitoes.

The relative importance of stagnant water and river water for the breeding of the local vectors needs investigation.

5. Housing

The village. A general plan is attached*. The village will be seen to lie on the right (west) bank of the river (Wadi El-Kebir). It is set back from the wadi bank about one hundred yards. At this point the wadi bank is a sandy precipice some twenty-six feet high. The village is four miles up the river from Lahej. The population as already noted is about two hundred and sixty.

Materials used in building. There are two kinds of house in the village, mudbrick and brushwood. The materials used in the mudbrick houses are local mud bound with tamarisk straw. The materials used in the brushwood houses are millet straw, tamarisk brushwood and date palm leaves. Some mudbrick and all brushwood houses are roofed with straw or brushwood.

* See map facing P.19

The houses. As a rule the living room of the house is raised some four feet from the ground. The first one we inspected was about ten feet square. The only door was five feet high and eighteen inches wide. Apart from the door the only ventilation was from one small trellis-work window. The house was quite clean and when the door was open was quite airy.

Outside this main room was a grass shelter. This was on the ground level and steps led down to it. This shelter was in two compartments. In one part the water pots were kept and in the other the cooking and other house work was done.

Most of the houses were on this pattern. The poorer ones had no courtyard. Even the best had only one room.

Occupants. The average number occupying a house was from 4 - 6.

Ventilation. In many of the houses, as already remarked, the roof is of brushwood, and this allows of some ventilation. In the better mudbrick houses there is no through ventilation and a single small unglazed window above the door is often the only ventilation apart from the door, but in some of the houses, part of the front wall is perforated. This is opened in the hot weather.

Livestock in houses. Livestock are not kept in the living room. Even in the poorer houses a courtyard shelter of some kind is provided, even for hens. In dry weather there is little nuisance arising from the keeping of livestock.

The main note to be made on the housing is the entire absence of sanitary accommodation. This has already been discussed under sanitation.

(b) El Waht (See Map)

H.H. the Sultan of Lahej had suggested El Waht as the most suitable place in his territory as a contrast to Haski. He very kindly approached an Aden merchant who owns a well built house just half a mile out of El Waht and got the use of this house for us during the period of the survey.

After leaving the fertile area of Lahej the journey lay along dry sandy tracks all the way and in some parts we encountered considerable sand dunes.

On our first morning in El Waht we set out for a walk around the town - and indeed for a desert settlement we felt that the title "town" was justified. We visited the school and found there about one hundred and fifty boys aged between five and fifteen. This number probably represents a population of some 2000.*

El Waht has eight wells and four mosques. We were assured that one of the mosques is well over 400 years old.

The people of El Waht are comfortably off and many of them are Seiyids. They are a very conservative and superstitious community. The schoolmaster, himself a Hadhrami Seiyid, warned us that we would not find the people anxious to help in the survey. During our walk we were invited into a house where we met the patron of the school. He is another Aden merchant We enlisted his interest in the survey and he promised to arrange that we should examine the schoolboys.

In El Waht itself we discovered another house belonging to our host and which was occupied only by an old lady who was its caretaker. We arranged to rent this for our dispensary.

Most of the cases seen during the El Waht survey, which lasted from Jan. 9th to 18th, were seen in this dispensary. The examination of the schoolboys was never completed because the schoolmaster was too nervous. He is a "foreigner" and very sensitive to criticism. After his patron had returned to Aden he assured us that should anything befall any of the boys after their examination by us their superstitious fathers would hold him responsible for allowing the examination and would blame that for the mishap.

One day we were called in to see a boy very ill with dysentery. A hasty message to Aden produced some serum from the R.A.F. Hospital. The boy responded well to injections. The boy's father was one of the leading Seiyids and his subsequent friendliness helped to break down much of the suspicion and to overcome the superstition.

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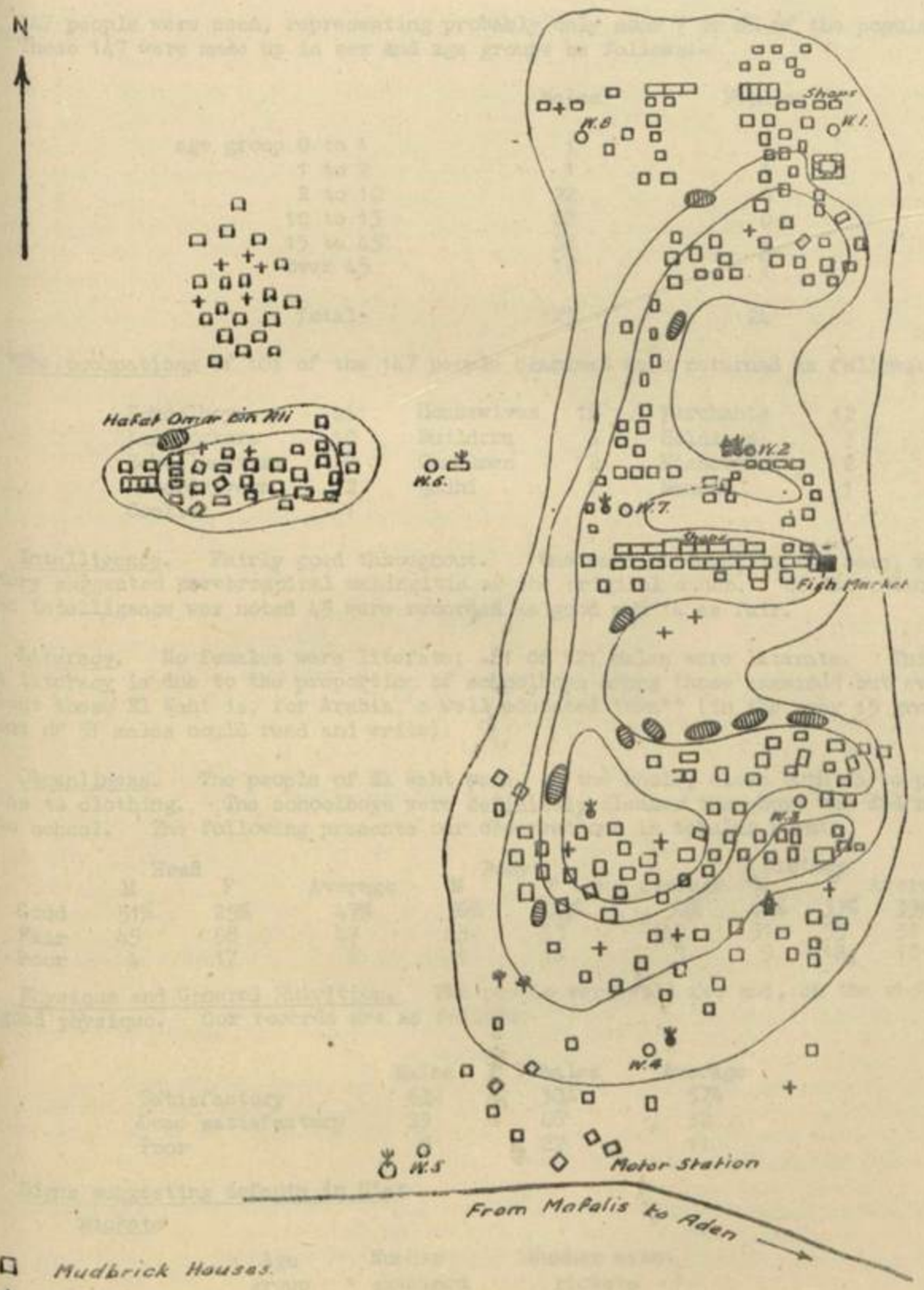
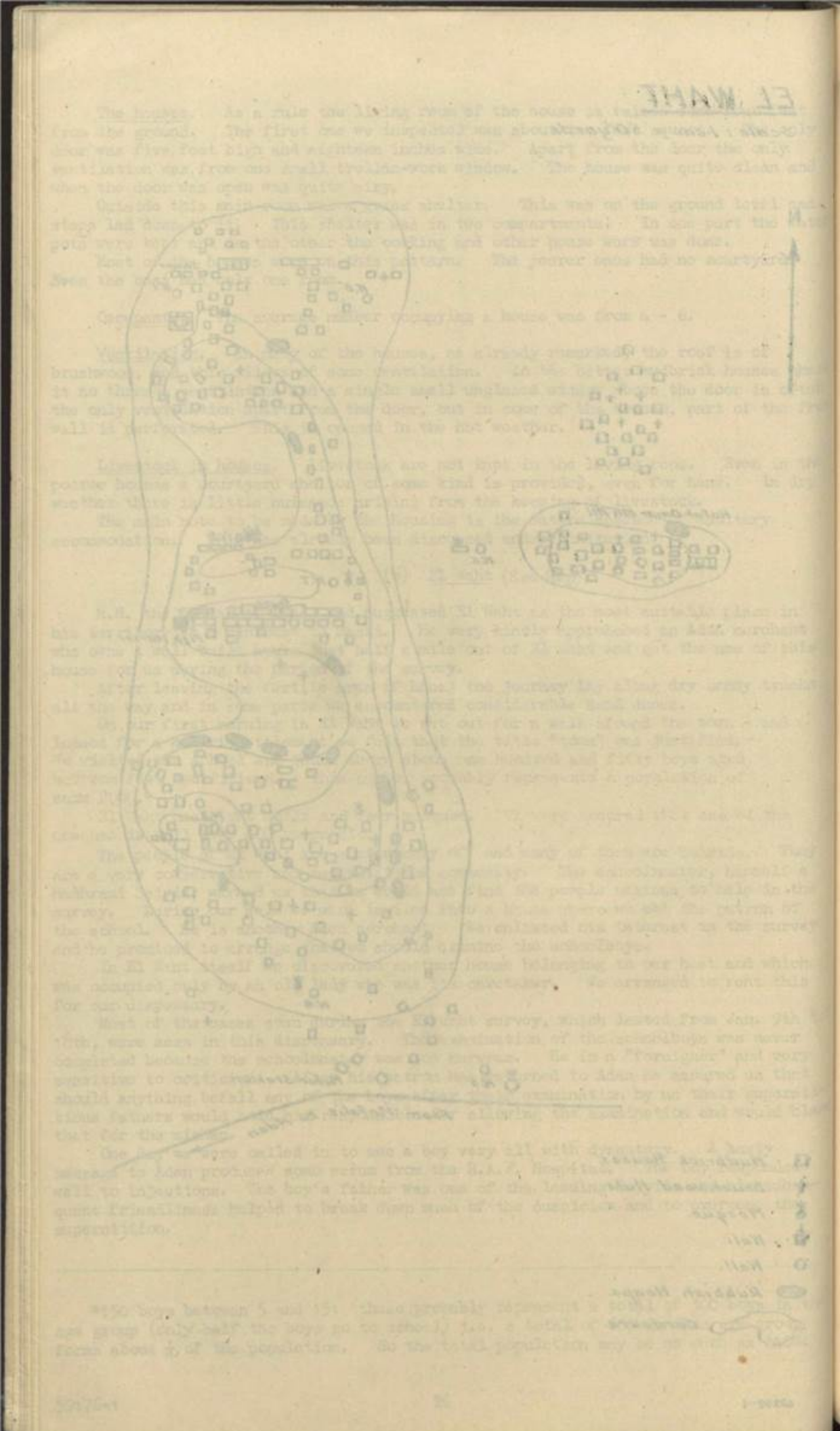
*150 boys between 5 and 15: these probably represent a total of 300 boys in that age group (only half the boys go to school) i.e. a total of 600 in this age group forms about ¼ of the population. So the total population may be as much as 2400.

EL WAHT

Scale : 1 cm = 50 yards





In spite of the care we had taken in Haski by sleeping under nets and taking prophylactic atebrin Dr. Petrie took fever on Jan. 13th and had to go into Aden to hospital on the 15th, leaving Dr. Seal to do the latter part of the survey in El Waht.

1. The Examination of the People

147 people were seen, representing probably only some 7 or 8% of the population. These 147 were made up in sex and age groups as follows:-

	Males	Females
age group 0 to 1	1	1
1 to 2	1	1
2 to 10	22	6
10 to 15	48	0
15 to 45	35	9
over 45	16	7
Total	123	24

*The occupations of 101 of the 147 people examined were returned as follows:-

Schoolboys	46	Housewives	16	Merchants	12
Landworkers	10	Builders	3	Soldiers	3
Schoolmasters	2	Camelmen	2	Fishermen	2
Motordrivers	2	Qadhi	1	Mansab	1
Coolie	1				

Intelligence. Fairly good throughout. One case of dementia was seen, whose history suggested cerebrospinal meningitis as the original cause. Of the other 59 whose intelligence was noted 45 were recorded as good and 14 as fair.

Literacy. No females were literate; 81 of 121 males were literate. This high literacy is due to the proportion of schoolboys among those examined but even without these El Waht is, for Arabia, a well educated town** (in the over 15 groups 23 out of 51 males could read and write).

Cleanliness. The people of El Waht were, on the whole, clean both as to person and as to clothing. The schoolboys were definitely cleaner than boys who did not go to school. The following presents our observations in tabular form:-

	Head			Body			Clothes		
	M	F	Average	M	F	Average	M	F	Average
Good	51%	25%	47%	56%	25%	50%	40%	33%	39%
Fair	45	58	47	43	63	47	51	55	51
Poor	4	17	6	1	12	3	9	12	10

Physique and General Nutrition. The people were well fed and, on the whole, of good physique. Our records are as follows:-

	Males	Females	Average
Satisfactory	63%	30%	57%
Less satisfactory	29	48	32
Poor	8	22	11

Signs suggesting defects in Diet

Rickets

Age group	Number examined	Number with rickets
2 - 10	28	3
10 - 15	46	7
Total	74	10

* This list of occupations shows that El Waht is not a typical desert settlement, where nearly all the people would be herds. It is, in fact, a special town and is determined by the position here of the graves of certain saints. It is in a sense a "holy city". I do not however think that this invalidates its usefulness to us in illustrating the conditions of health in this geographical area.

** Education here means ability to read and write. Reading is confined almost entirely to the study of the Qoran and there is little relation in such a country between education and "broadening" of the mind.

Teeth and Gums. The teeth were, on the whole, good but 4/27 children in the 2 - 10 group, and 3/43 in the 10 - 15 group (i.e. a total of 7/70 under 15) showed faulty eruption. Over 45, 6/23 were edentulous.

The condition of the gums was unsatisfactory. In 138 people examined only 54 were returned as healthy. Of the 84 unhealthy 71 had spongy gums and 13 had pyorrhoea or gingivitis or both.

No cases of night blindness or xerophthalmia were seen but one case of hyperkeratosis was noted.

Eye Conditions. Trachoma was present in 77 of 125 cases examined. These 77 were in the following stages - Tr. I, 25. Tr. II, 17. Tr. III, 19 and Tr. IV, 16 cases. The infection was fairly evenly distributed over the age groups but showed a higher incidence in youth as the following figures illustrate:- under 10, 80% infected; 10 - 15, 71%; 15 - 45, 55%; over 45, 39%.

20 of the 25 cases of Tr. I were under 15 years of age.
15 of the 17 cases of Tr. II " " " " " "

Other eye conditions. Senile cataract 11, traumatic cataract 1, corneal opacity 9, conjunctivitis 8, blepharitis 3, entropion 1, pterygium 1, and strabismus 1. All the cases of senile cataract were in the over 45 group, and in this group 9 of 16 males suffered from senile cataract.

Visual acuity was reduced to F.C. at 6 metres or less in 3 cases in both eyes, and in 6 cases in one eye.

Visual acuity was lost, or was less than perception of hand movements, in 4 cases in both eyes and 5 cases in one eye.

This gives a total of 18 cases in which the visual acuity in one or both eyes was reduced to, or was less than, F.C./6. These 18 cases were all in the over 15 groups; therefore 27% of the adult population were blind or partially so in at least one eye, and 10% in both eyes.

Lung Conditions. 12 cases were noted as follows:-

Asthma 2
Pulmonary tuberculosis 4 } all in the over 15 groups
Chronic cough 6 (4 over and 2 under 15)

2 cases of whooping cough are not included in this list.

Skin Conditions. 10 cases were noted as follows:-

Septic spots 3, impetigo 2, seborrhoea 1, baheq 1, acne vulgaris 1, tinea capitis 1, hyperkeratosis 1.
No case of Yemen Ulcer was seen.
One schoolboy was noted as having red hair!

Deformities and bone conditions. One badly united Colles's fracture.

Evidences of malaria. The spleen was not palpable in any of the 28 children seen in the 2 - 10 group, but was palpable in 2 of the 48 boys in the 10 - 15 group (to 1 finger in one and 2 fingers in the other).

In no case was the spleen palpable in any of the other age groups.

Haemoglobin percentage was estimated in 70 cases (55 males and 15 females) 3 M. and 2 F., less than 60%; 31 M. and 8 F. between 60% and 80%; 21 M. and 5 F. over 80%. The average throughout was 78.6%.

Vaccinal State. 20 Males and 2 Females had been vaccinated,
36 Males and 14 Females had had smallpox,
63 Males and 8 Females were unvaccinated.
Protection against smallpox 50%.

Vital Statistics. In this very conservative community very few females were seen and the following factors tend to make our figures inaccurate - i. We saw relatively few women at all. ii. We probably saw very few unmarried women relative to married especially under 30. iii. The older women are vague about the total number of children born to them.

The following figures were collected;

9 women in the 15 - 45 group were seen, 7 married;
7 women in the over 45 group were seen, 6 married;
2 married women in the under 45 group and 1 in the over 45 group were childless
2 women in the over 45 group were widows.

33 children were born alive to 9 women in 15 - 45 group. F.R. 3.7
33 " " " " " 7 married " M.F.R. 4.7 (6.6 per mother)
34 " " " " " 7 women in over 45 group F.R. 4.9
34 " " " " " 6 married " M.F.R. 5.7 (6.8 per mother)
67 " " " " " 16 adult women F.R. 4.2
67 " " " " " 13 married " M.F.R. 5.1

of 67 children born alive 11 died in infancy (9/33 and 2/34)
Infant mortality, 273 per 1000 (under 45 group)
of 67 children born alive 24 died before the age of 5 (13/33 and 11/34).
Child mortality under five, 367 per 1000.

Other questions asked related to the number of times married. By the age of thirty this is usually at least twice and the older women have usually experienced four or more marriages. In the 15-45 group statistics concerning widowhood and divorce seem of little importance as these are only interim states between one marriage and another.

Prevalence of Morbid Conditions. These include conditions already mentioned.

History of "fever"	30M.	4F.	= 34	Dyspepsia	3M.	= 3
Constipation		14F.	= 14*	Whooping cough	2M.	= 2
Otitis media	3M.	3F.	= 6**	Asthma	1M. 1F.	= 2
Dysentery (bacillary)	5M.	1F.	= 6	Infantile diarrhoea	1F.	= 1
Cough	6M.		= 6	Monoplegia	1M.	= 1
Joint pains	6M.	5F.	= 11	Piles	1M.	= 1
Chicken pox	5M.		= 5	Deafness	1M.	= 1
Pulmonary tuberculosis	2M.	2F.	= 4	Camel Bite	1M.	= 1
				Dementia	1M. (after C.S.M.)	= 1

2. Nutrition

Physique. Satisfactory.

Diet. In this connection 75 persons were questioned: 12 under 10, 7 in the 10 - 15 group, 37 in the 15 - 45 group, and 19 over 45.

Meals are eaten three times a day. The principle food is millet though most people are able to afford some rice as well and a few have barley.

Rice is eaten boiled - millet and barley are eaten both as a kind of porridge ('asid) and as bread. The people are able to maintain a store of grain, so there is little seasonal variation in their diet.

Consumption of Meat. About half of the population eat meat regularly, and most of the others have it occasionally.
Fish. A regular constituent of the diet in nearly all cases.
Milk. Only about half of the population take milk regularly.
Vegetables. Nearly all have some of the following:- tomatoes, radishes, parsley, egg plant, and "ladies' fingers". Vegetables are always eaten cooked. About a third can afford, and do have, fruit. The main fruits available are bananas and guavas.

Discussion. The diet seems to be reasonably good and especially in its content of first class protein.

In spite of this over 60% of the people have spongy gums and rickets occurs in about 10% of the children under 15. Here the lack is not due to poverty for El Waht is a relatively wealthy town. It would seem that the main fault is ignorance and the main points on which instruction is required are:-

i. That vegetables, especially tomatoes, should be eaten raw.
ii. That children should not be kept on the breast after the first year of life.***

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* Constipation is much more prevalent than this figure indicates and is in fact almost universal.

** Of these 5 were in the under 10 age groups i.e. 5/32 under 10 had otitis media.

*** The Qoran in Surat El Baqara v.233, and in Surat Luqman, advises the breast feeding of children till two years old at least and tradition says that Mohammed himself was weaned about that age. This might militate against more modern teaching. It might be more acceptable to the conservative to suggest that after 1 year breast feeding should be supplemented.

3. Water Supply

Source. The village is entirely dependent for its water on wells, of these there are eight (see plan).

Accessibility of Source. The water is 100 ft. from the surface and has in all but one case to be drawn by hand. In one well camels draw the water. For the most part the wells are conveniently situated for the houses, especially in the main village. In Hafat 'Omar bin 'Ali the well is outside the built-up area and some people have as far as ¼ mile to go to the well.

Protection of Source. In each case the well head is raised 1 to 2 ft. above the general ground level. In some cases a shelter has been built over the well, in some cases too a wall 12 - 18 ft. from the well mouth has been built to keep out drifting sand. The wells are carefully lined with stone and are in most cases cemented. There is no particular slope away from the well mouth and the surrounding ground tends to become puddled.

Existent Contamination. About half of the wells are badly puddled about the well head and in at least two of these the same area is badly fouled by droppings from camels, sheep and goats.

Possible future Contamination. Seepage of foul water from mosques and well heads through cracks in the well wall. Heavy rains and sand storms must carry contamination into the wells.

Discussion. This is a village in which many relatively wealthy people live and in which wealthy merchants from Aden take an interest. It should therefore be possible to educate the people here in the proper care of their wells. Two wells are good but even better patterns should be introduced, with a properly sloped and plastered plinth about the well head. Old wells should probably be filled in and new ones dug.

The supply of water is adequate all the year round.

The occurrence of bacillary dysentery in El Waht underlines the importance of education in care of their water supply.

4. Sanitation

Disposal of domestic dry refuse and trade refuse. Large rubbish dumps are scattered irregularly about the village. Occasional erratic attempts are made to burn these dumps but for the most part disintegration is left to the sun and the wind.

Disposal of excreta. In the mud brick houses which form the main bulk of the village a small room at, or just under, ground level is reserved solely for the reception of excreta. The method is a variant of the "long-drop" system described on page 100. Here it is adapted for single storey houses. The reception chamber is sometimes, but not often, bricked up. In most cases it is open to the street. These rooms are cleaned out only very occasionally, and some not at all.

In brushwood houses no provision is made for the reception of excreta in the house. In cases of sick people (e.g. dysentery cases we actually visited) excreta is passed on to the floor of the living room, covered over with sand and left to dry.

Public Conveniences. None other than those in mosques.

Discussion. Here again much might be done by education. The danger from dysentery is obvious - infection in such a village must often be borne by dust, flies and water; sometimes it will be carried on infected fingers and so to food.

Even in dry weather there is considerable nuisance in the houses and in the streets. In wet weather this must be much worse. The market place, especially the fish market, was unsatisfactory and should have some sort of sanitary supervision.

Housing

Village site &c. El Waht lies on the coastal plain six miles south of Lahej and eleven miles from the sea at Hiswa. The Wadi El Kebir skirts its western boundary and an irrigation channel from the wadi is led on to a cultivated area north and east of the village. The control of the water for cultivation is in the hands of the Lahej Sultan and only infrequently does he spare water for the fields

of El Waht so that the village site resembles more that of the desert coastal plain than that of an oasis. This is emphasised by the absence of palm trees.

The village itself lies on a triangular hump of sand between the wadi and the irrigated area. On this hump are lesser humps - some natural and some formed by rubbish heaps, so that, while from a distance El Waht seems to lie on flat ground, in the village one finds many irregularities.

The village covers a fairly wide area for its population and is divided into definite sections. These are for the most part well laid out and there is no sense of overcrowding.

The motor road from Aden to Mafalis comes to the southernmost edge of the village and then turns sharply westward without going into the village.

Materials used in building. Both mud brick and brushwood houses were met with. The majority are of mud brick.

The brushwood houses are largely of palm branches and tamarisk brushwood. These are chiefly occupied by Somalis, who form a small self contained community.

The Houses. Even in the poorer houses there are usually two rooms while in the better class houses four or five rooms are quite usual. The size of the rooms varies from 10 x 8 ft. in the poorer houses to 10 x 16 ft. in the better ones.

An average of 4 persons per sleeping room was worked out for the poorer houses and between 2 and 3 for the better houses.

Ventilation. In the brushwood houses air enters through the interstices of the brushwood. The only other provision made for ventilation is the door, which, though often open during the day, is closed at night.

In the mudbrick houses there are usually two windows for each room. These windows are often on the same side of the room as the door and fail to make any provision for through ventilation. They are usually at or just above the floor level and are about 18" x 30" in size.

The usefulness of such windows as are provided depends entirely on the occupants of the house. At night people usually close their doors and windows entirely.

Livestock. Where livestock is kept there is a special brushwood enclosure in the courtyard of the house so that beasts do not usually come into the houses.

Discussion. Improvements in housing might be expected if the people could be taught the benefits of fresh air and the dangers of overcrowding and bad sanitation.

Special Investigations Relating to Malaria

General. El Waht is a fair representative of the drier part of the Abdali area. Its population of over 2,000 is rather large for the purposes of our survey.

The people are on the whole comfortably off - merchants, landowners and camelmen. The large proportion of Seiyids gives the place a sense of gentility. A number of its citizens have been judges and the like in distant parts and have returned to El Waht in their retirement. Others are retired merchants who have returned from a life of trading up and down the Red Sea ports to their home town.

Apart from Somalis real immigrants are few.

The general standard of housing compares favourably with anything seen elsewhere in the Protectorate.

El Waht is on the regular trade route to south west Yemen (Mafalis) and during our stay there cars passed along this road about twice a day.

Though there was no active malaria while we were in El Waht, many people gave a history of having had fever and a few mosquitoes were caught.

No breeding places were found, although domestic water pots, the wells and the puddles about the wells were examined.

The mosquitoes caught were all identified as Anopheles gambiae.

Discussion. A certain amount of flood water is allowed down to El Waht during the year and irrigated fields probably give mosquitoes a chance to breed. Instruction in irrigation methods and in simple anti-malarial precautions ought to make El Waht mosquito-free and safe from malaria.

LAHEJ

Lahej, the Abduli capital, is much too big a town to be properly surveyed in the short time we could have given to it on this visit but, as an addendum to this report on the Abduli survey (Haski and El Waht) we submit some notes about Lahej:-

i. A report of a short visit to Lahej paid by Dr. Seal in March, 1941; and
ii. A medical report on Lahej compiled by Dr. G. K. GOKALE, M.O. of the Lahej dispensary and Dr. Seal's comments on these notes.

SUBEIHI TRIBAL AREA

As soon as DR. PETRIE had recovered from malaria, plans were made to leave for the Subeihi country. Everything was ready for a start on Jan 25 but on that day unfortunately Dr. Seal went down with dysentery and had to go into hospital. It was decided, however, to go on with the programme and Dr. Petrie left Aden by motor next day.

Geography of the Subeihi Country

The Subeihi area is the most westerly of the Protectorate. It is a strip of country thirty miles broad running from Bab el Mandeb in the west some eighty miles to the 'Abdali boundary near Ras Imran in the east. Its southern boundary is thus formed by the sea while the irregular northern boundary is formed by the Yemen border. On the west it is also bounded by the Yemen while in the north east there is the Haushabi border and in the south east the 'Abdali (see map).

The country, especially near the coast, is, for the most part dry and barren - a section in the south east is in fact quite desert - but all along the Yemeni border there are various mountain masses down whose sides come streams both seasonal and perennial. These streams form complicated wadi systems of greater or less fertility and it is in these wadis for the most part that the settled population is to be found. Between the wadis rough desert scrub is in some places, and at some seasons, sufficiently plentiful to support flocks of sheep and goats or herds of camels. In such areas the people are nomadic and follow their flocks from pasture to pasture and from well to well according to the season. On the coast there are a few fishing villages.

The Subeihis thus fall into four groups which overlap one another in some districts, but are quite distinct. These groups are:-

i. A settled agricultural people in the wadis, especially where there are perennial streams.
ii. A settled pastoral people in the wadis and especially in the middle section of the wadis between the hills and the sea where there is not enough water for agriculture.
iii. A nomadic pastoral people in the drier lands between the wadis and in the lower drier sections of the wadis themselves.
iv. Fisher folk on the sea shore.

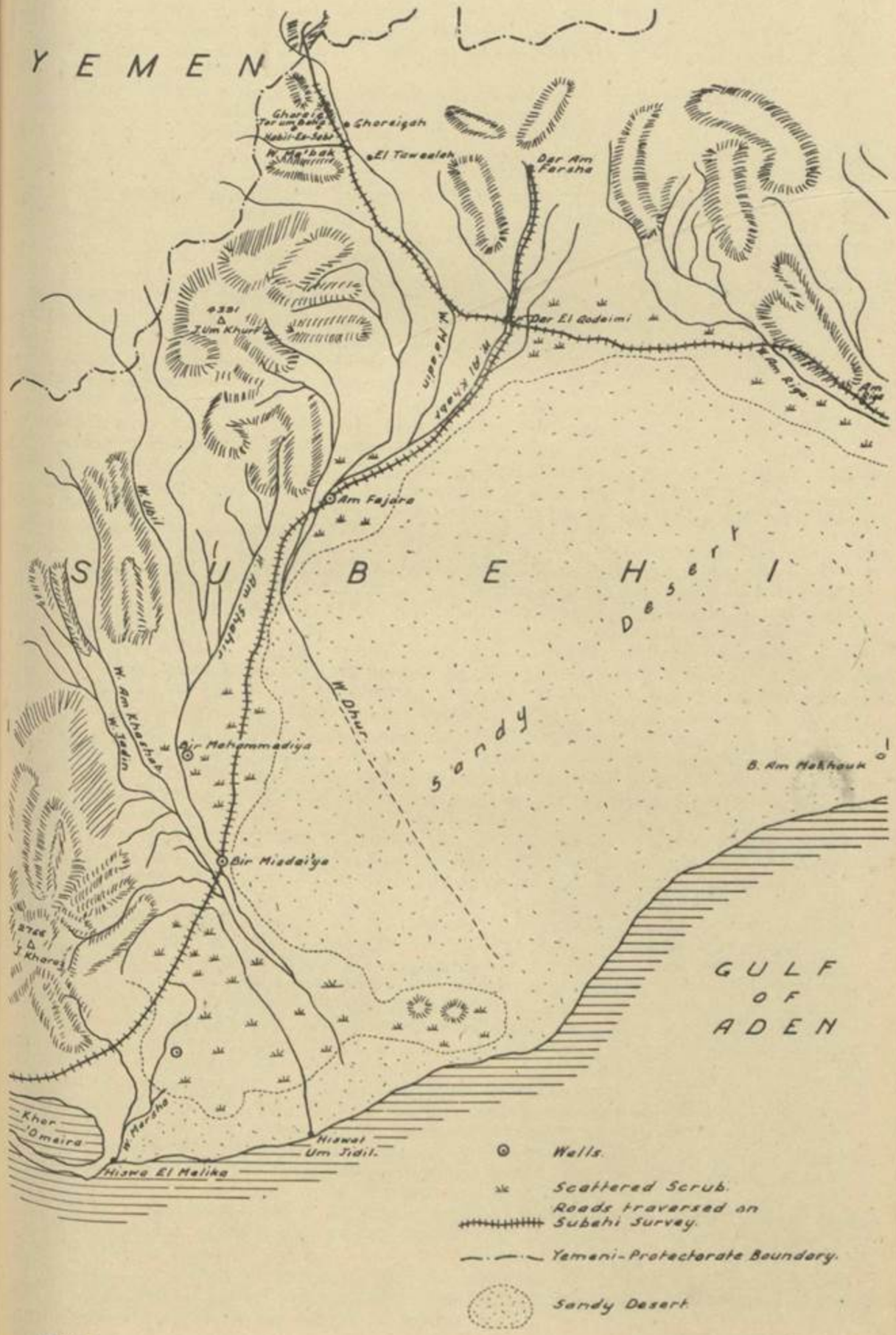
The Subeihi survey was planned to cover a fertile wadi, Wadi Ma'adin, and a fishing village, Khor 'umeira. The journey between these led through the country of the nomads and expeditions from each took us to drier wadis - at Dar am Farsha and Turan.

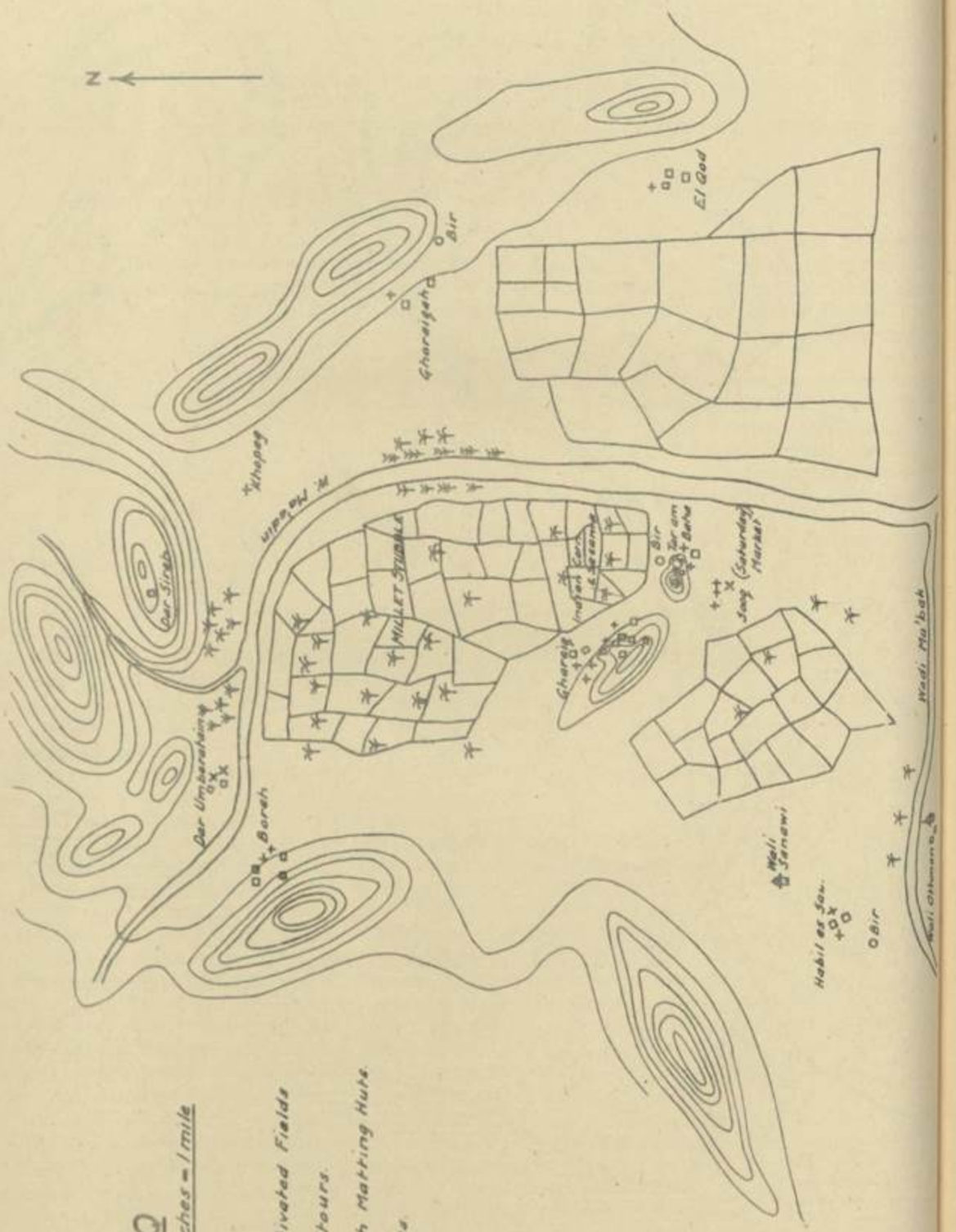
The Subeihis are by nature a predatory people. For generations they have been locally notorious as raiders of caravans, sheep stealers and camel thieves. They recognise no single leader but are divided into many subtribes which in some cases are little more than family groups. Bitter blood feuds and family quarrels take such an important place in their lives that some areas suitable for cultivation cannot be seriously planted out for fear of "neighbourly interference" and in the drier areas men travel beyond the boundaries of their own tribal section in fear of their lives.

Recent attempts to settle the Subeihis have met with considerable success and the establishment of an administrative post at Tor am Baha has brought some semblance of a stable government into the chaos.

The Journey to Tor am Baha

We left the Colony of Aden at Sheikh Othman about 2.15 p.m. and took the westward road by Bir Ahmed over the desert to Bir am Durcimiya thirty miles from Aden. Bir am Durcimiya is a lonely well in an area of desert scrub. Though not strictly in Subeihi country Subeihi herdsmen graze their flocks in this area and the well is used mainly by them. Soon after Bir am Durcimiya we entered the Wadi am Rija' which we followed to the fair sized village of am Riga' - the first





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human settlement since Bir Ahmed over thirty miles back. At Am Riga we struck westwards across country. Here the going was bad and there were several deep sand drifts to negotiate.

Our next village was Dar el Qudeimi and after that signs of settled habitation became more frequent. Soon we entered Wadi Ma'adin, the most fertile wadi in the Subeihi country. We had not proceeded far up this wadi when we came to a stream of running water and entered a country beautifully fresh and green - with bushes, grass, trees and waving palms - a home of malaria and the first of CARTER'S* areas to be visited on the survey.

Shortly before sunset and registering just under eighty miles from Aden we arrived at Tor am Baha, our survey headquarters in Wadi Ma'adin.

(a) Tor am Baha

Tor am Baha is a mass of granite which forms a hillock rising some eighty to a hundred feet above the wadi. On this the administration post is housed. At the time of the survey there was a stone hut for the European officer, a straw hut for his secretary, a straw hut for the officer of the Government guards, and two sets of buildings for the party of thirty soldiers who man the post. These soldiers are from the Government guards and from the Sultan of Lahej's troops, for the Sultan has nominal suzerainty over the Subeihis.

The dwelling of the European officer was put at my disposal by his secretary. Mr. DAVEY, the officer in question, was absent on duty at the time but had left a very cordial note of welcome for us.

The building was really only a rough stone shelter, circular in shape and eighteen feet across. It was six feet high in the centre and roofed over with untrimmed timber. Three stout tree trunks near the centre of the room formed pillars supporting the roof. Two doorways without doors and four unglazed windows provided adequate ventilation. In spite of its primitive character, a homeliness had been given to this rough dwelling by carpeting its beaten floor and furnishing the room with books, tables, chairs and a wireless set.**

The Survey. On the first morning in Tor am Baha the Subeihi dispenser reported for duty and remained with us during our stay in Wadi Ma'adin. We found the wadi to contain numerous little villages. The nearest of these, perched on the same outcrop of granite as Tor am Baha, was Ghariq (See map). Ghariq is a typical hill village. A cluster of small houses, mostly of stone, scrambling up the hillside. The population of Ghariq is probably about 200 and, as it was otherwise suitable, we chose it as the main centre for this part of the Subeihi survey.

Ghariq overlooks the Wadi Ma'adin where it is about three quarters to one mile wide. From the village we looked down into the wadi upon fields of indian corn interspersed with date palms. From the village we went down into these fields and across to the ghail*** where we found a man "dividing" the water. For a settled number of hours the water is allowed to run on to the fields of certain people,

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*Early in this century CARTER, travelling in the Protectorate, gathered a number of entomological specimens, among them a tsetse fly. Only one of these tsetses got home safely to England but that one is still in the British Museum and is the only tsetse fly to have been taken home from anywhere except Africa. It is a Glossina tachinoide. In his article (Brit.Med.J., Vol.2, 1906, pg.1393) describing the capture of this fly CARTER declares that in several areas covered by his journey these flies annoyed the beasts and were much complained of by the local people. He names as specific areas in which these flies were found the area now under consideration, the valley of the Wadi Natid, the valley of the Wadi Aqqan and an area between Jebel Hasha and Jebel Jehaf. Of these areas the survey visited the first three and Dr. SCOTT and Mr. BRITTEN in their 1938 expedition for the British Museum visited the fourth. CARTER'S tsetse fly remains unique in spite of these and other searches.

**The secretary's hut was even more simple, and the soldiers' quarters were also poor. No sanitary accommodation had been provided for any of them. These conditions were, however, temporary and I referred to them in an interim report at the time. I then suggested that every post of this kind should be simply but efficiently equipped as to housing and sanitation. I suggested this not only as a matter of comfort for those stationed there but so that the post might be a practical illustration to the district of what could be done with the materials at hand.

***A Ghail is a perennial stream. The word denotes the actual body of water and distinguishes it both from the wadi in which it flows and from the various saqias or channels which it may occupy in turn.

then on to those of others and so on so that each gets his agreed share. Quarrels over this division of the water used to be very frequent and very bloody. Now they are settled by arbitration and the soldiers at Tor am Baha are there to enforce the settlement.

At the other side of the wadi we visited another and smaller village called Ghariqa and saw its well - a narrow tube going down some sixty or more feet and yielding little water even then. People depend mostly on the ghail for their water.

We returned over the wadi lower down and went in behind the hill of Tor am Baha to emerge on the open plain of Suq es Sabt (i.e. Saturday market). It happened to be Saturday and the market was in full swing. The stalls contained cloth from Aden, qat from Yemen, vegetables from Yemen (these were mostly leek tops and radishes), dates, pottery (mostly water pots), hulba, cigarettes and sweets of the Turkish delight variety. The people at the market came from the villages all around and from villages over the Yemen border which is only a few miles away.

In the market the Sheikh of Ghariq and the Sheikh of Ghariqa both came up to pay their respects and to offer their help with the survey. From them and their friends we again heard how impossible it has been until recently to grow anything but the simplest crops in the wadi because raiding parties came down and destroyed things so often. Now with an armed body of troops at Tor am Baha peace is being maintained and more and better vegetables should be easily grown in Wadi Ma'adin.

Next day at the invitation of the Sheikh of Ghariq we sat in the courtyard of his house and examined patients. For the next two days this was our headquarters and it proved fairly satisfactory. The people in Wadi Ma'adin, however, were even more averse to bringing their women than those seen elsewhere. In the 75 people seen from Ghariq, 8 only were females.

Several of the patients seen gave histories of passing blood in the stool and in the few from whom specimens were obtained bilharzia eggs were found.

In Tor am Baha itself several of the soldiers, both from the Government guards and from the troops of the Sultan, wanted to be seen and a number of them were included in the survey. In the section which follows on the examination of the people the soldiers are reported separately.

After completing the cards for Ghariq, examination was made of the water supply, the sanitation, the housing, and observations were taken for the making of a map of the district. All these matters are referred to later in their relevant sections.

Meanwhile people from neighbouring villages in the wadi visited camp for treatment and the doctor was asked to visit several villages. In one of these villages, Tawiliya, over thirty cases were seen. The records of various groups were kept separately but for the following report they are all grouped under the heading "Wadi Ma'adin".

A day was set aside for examining the ghail and collecting specimens. Various mosquito larvae and pupae were collected and some were hatched out to the adult form. Snails were collected from irrigation channels and from the ghail itself, which is rich in weed.

It was during this expedition that we were asked to visit the village of Tawiliya. It is a mile down the wadi from Tor am Baha. The request was on behalf of a very respected and very sick member of their community. In agreeing to go we asked them to have at least another twenty of their people present for examination at the same time. They kept their side of the bargain very well and two useful visits were made to their village.

The day after the second visit to Tawiliya the Sheikh of Dar am Farsha arrived in camp and asked that the doctor should go to his village and see his sick brother. In the course of conversation the Sheikh mentioned the opening of a new school at Dar am Farsha. He spoke with pardonable pride of the school so I asked that on my visit we might be allowed to see the school and examine the schoolboys. This was agreed to, and next day was set aside for an expedition to Dar am Farsha.
Dar am Farsha is the principle village in Wadi Dar am Farsha. It was a useful addition to the survey because, in contrast to Wadi Ma'adin, Wadi Dar am Farsha has no ghail and is for most of the year just a dry river bed. The expedition took the whole day and 57 cases were seen. They make an interesting contrast with Wadi Ma'adin especially as regards malaria and bilharziasis.

From the above it will be evident that the following groups of people were seen:- i. Those from Wadi Ma'adin. ii. Those from Dar am Farsha, and iii. The soldiers at Tor am Baha. These groups will be kept in mind in the report which follows.

Two days after the visit to Dar am Farsha Dr. SEAL rejoined us and next day we set off for the other Subeihi area to be surveyed, the area around Khor 'Umeira.

The Examination of the People

Of the total of 223 people seen 139 were from Wadi Ma'adin, 57 were from Dar am Farsha and 27 were soldiers at Tor am Baha.
These fell into the following groups:-

Age	Wadi Ma'adin	Dar am Farsha	Soldiers
1 - 2 years	3 males 1 female	-	-
2 - 10 "	46 " 1 "	40 males	-
10 - 15 "	15 " 1 "	9 "	-
15 - 45 "	53 " 5 females	7 "	27 males
over 45 "	7 " 7 "	1 male	-

Occupations

Wadi Ma'adin. 92 males and 4 females gave particulars of their occupations as follows:-

Land workers	57 males	2 females
Schoolboys	15 "	
Herds	13 "	1 female
Qat sellers	1 male	1 "
Teachers	2 males	
Sheikhs	2 "	
Beggars	2 "	

Dar am Farsha. 48 males gave particulars of their occupations as follows:-

Schoolboys	41 (it will be remembered that the
Shepherds	3 survey here was mainly of the
Land workers	2 school)
Teacher	1
Sheikh	1

Tor am Baha. Of the 27 soldiers seen, 12 were Government guards and 15 were soldiers of the Sultan.

Intelligence

	Wadi Ma'adin	Dar am Farsha	Soldiers
Good	83 males, 6 females	38 males	22 males
Fair	27 " 7 "	9 "	1 male
Poor	1 male -	-	-

Literacy

Wadi Ma'adin. Of 104 males 30 claimed to be able to read and write - these included all the schoolboys. In the over 15 groups 9/50 claimed to be literate, i.e. an adult literacy of 18%.

Dar am Farsha. Of 56 examined 44 claimed to be literate; 40 of those were schoolboys; 4/8 adults claimed to be literate but as the 8 in question included the Sheikh and the schoolmaster the figures cannot be taken as representative.

Soldiers. 7/27 claimed to be able to read and write.

Cleanliness

		Head	Body	Clothes
Wadi Ma'adin	Good	18%	20%	18%
	Fair	75%	75%	69%
	Poor	7%	10%	17% a number with lice
Dar am Farsha	Good	22%	23%	18%
	Fair	65%	71%	71%
	Poor	13%	6%	11% a number with lice
Soldiers at Tor am Baha	Good	41%	41%	35%
	Fair	59%	59%	65%
	Poor	-	-	-

Any programme of education in the Subeihi country should include some teaching in cleanliness. In Wadi Ma'adin the figures for the sexes have not been shown separately. None of the fourteen females seen was returned as "good".

Physique and general condition

	Wadi Ma'adin Males	Wadi Ma'adin Females	Dar am Farsha	Soldiers
Satisfactory	29%	9%	24%	66%
Less Satisfactory	60%	82%	69%	33%
Poor	11%	18%	7%	-

The physique and general condition as seen from the above table were not very good in either of the wadis and were well below that of the soldiers.

Signs suggesting dietetic deficiencies

Rickets. 113 children under 15 were examined for rickets - of these 64 were from Wadi Ma'adin and 49 from Dar am Farsha.

Wadi Ma'adin - Under 2 years. 4 seen, 1 showed signs of rickets
2 - 10 years. 47 " 7 " " " "
10 - 15 years. 16 " 2 " " " "
i.e. 10/64 (16%) showed signs of rickets.

Dar am Farsha - 2 - 10 years. 40 seen, 6 showed signs of rickets
10 - 15 years. 9 " 3 " " " "
i.e. 9/49 (18%) showed signs of rickets.

Teeth. Except in the case of the soldiers the teeth were unsatisfactory.

Wadi Ma'adin - 125 examined, 57 showed signs of carious teeth or irregular eruption. 2 - 10 years 8/28 irregular eruption.
10 - 15 years 2/11 " "

Dar am Farsha - 48 people examined, 23 showed carious teeth or irregular eruption. 2 - 10 years 10/20 irregular eruption.
10 - 15 years 1/5 " "

Soldiers - 9/23 showed carious teeth.

Gums. The majority of the people seen had unhealthy gums.

Wadi Ma'adin - 74/128 unhealthy gums, 66 with spongy gums and 8 with pyorrhoea. In 3 cases the gums were ulcerated and bleeding, 1 of these patients had subperiosteal swellings of the left tibia. All 4 babes under 2 years had good teeth and healthy gums.

Dar am Farsha - 23/57 unhealthy gums, 20 with spongy gums and 3 with pyorrhoea.

Soldiers - 17/24 unhealthy gums, 16 with spongy gums and 1 with pyorrhoea.

Other conditions suggesting defective diet. Night blindness 3, Yemen ulcer 16, angular stomatitis was seen in 8 of the schoolboys at Dar am Farsha, bahaq 11, septic spots 4, hyperkeratosis was noted in several cases.

Eye Conditions

Trachoma

Wadi Ma'adin - 43/131 or about 33% were trachomatous. The disease was observed in the following stages. Tr.I, 34, Tr.II, 5, Tr.III, 3, Tr.IV, 1. The infection was heavier in the age groups under 15 (49%) than in those over 15 (18%).

Dar am Farsha - 22/53, or over 41%, were trachomatous. The disease was observed in the following stages Tr.I, 19, Tr.II, 3, 46% of those under 15 were infected and 14% of those over 15.

Soldiers - 14/23, or about 61%, were trachomatous. The disease was observed in the following stages Tr.I, 5, Tr.II, 1, Tr.III, 6, Tr.IV, 2.

Comment - The figures for the soldiers (61% adult infection) are in sharp contrast to the native Subeihi figures and emphasise the finding that trachoma is less prevalent in Subeihiland than elsewhere in the Protectorate.

Other Eye Conditions

Wadi Ma'adin - Senile cataract 5, acute conjunctivitis 3, squint 3, corneal opacity 3, night blindness 2, blepharitis 1, total loss of one eye 1.

Dar am Farsha - Senile cataract 2, acute purulent conjunctivitis 1, squint 1, adherent leucoma 1, lagophthalmos 1.

Soldiers - 1 case of early cataract.

Heart Conditions

Wadi Ma'adin - Mitral systolic murmer was noted in 4 cases, 3 of these under 10. 3 of these also had cardiac enlargement and the fourth had tachycardia (128). In one of these cases a history suggestive of acute rheumatism was obtained. This patient also suffered from asthma.
Generalised precordial pulsation was noted in 1 case; reduplication of the second sound was noted in 2 cases; auricular fibrilation was noted in 1 case.

Dar am Farsha - Nil.

Soldiers - Enlarged heart with systolic murmur, 2 cases.

Lung Conditions

Wadi Ma'adin - Pulmonary tuberculosis was suspected in 5 cases;
acute lobar pneumonia, 1 case;
bronchitis, 1 case (under 2 years);
asthma, 1 case (under 10 already noted above).

Dar am Farsha - Bronchitis, 4 cases (2 under 10; 2 over 15)
laryngeal tuberculosis, 1 case.

Soldiers - Chronic bronchitis, 1 case.

Skin Conditions

Wadi Ma'adin - Yemen ulcer 7, septic spots 6, bahaq 3, scabies 3, acne vulgaris 1, blue skin 1, undiagnosed 4.

Dar am Farsha - Scabies 6, bahaq 5, ulcerated ringworm 1, leucoderma 1.

Soldiers - Bahaq 3, ringworm 2, tinea barbae 1, septic spots 1, urticaria 1.

Deformities and Bone Conditions

Wadi Ma'adin - From injury 3 cases viz:-
1 scarred face from Euphorbia juice,
1 deformed R. arm from bullet wound,
1 deformed chest from old fracture of ribs.
Tumours 2. 1 lipoma cheek,
1 fibrolipoma over tib. tuberosity.
Various 6. Anterior bowing tibia, 1.
Subperiosteal gumma, 1.
Subperiosteal swellings (Scurvy), 1.
Wasted leg from anterior poliomyelitis, 1.
Sunken bridge of nose, 1.
Six fingers on each hand, 1.

Dar am Farsha - Bowing of tibia, 1.
Swelling over R. tibia, 1 (father said to be syphilitic) } both under 15.
Adherent scar over R. knee, 1.

Soldiers - Nil.

Evidences of Malaria

Wadi Ma'adin - Splenic enlargement was noted in 82 of the 137 subjects examined. In the 2 - 10 group 37/47 had enlarged spleens. Splenic index 79%.

Details of enlarged spleens:-

1 fingerbreadth below costal margin	- 4 cases	Average enlarged spleen - 3 fingers.
2 fingerbreadths " " "	- 11 "	
3 " " " "	- 9 "	
4 " " " "	- 7 "	
5 or over	- 6 "	

Dar am Farsha - Splenic enlargement was noted in 12 of 57 cases examined. In the 2 - 10 group 10/40 had enlarged spleen. Splenic index 25%.

Details of enlarged spleens:-

1 fingerbreadth below costal margin	- 2 cases	Average enlarged spleen - 2.5 fingers.
2 fingerbreadths " " "	- 5 "	
3 " " " "	- 1 case	
5 or more	- 2 cases	

Soldiers at Tor am Baha - 11/27 had splenic enlargement. Adult spleen rate 41%.

Evidences of Bilharziasis

Wadi Ma'adin - 8 persons were said to pass blood in the stool. Of these one was a baby under 2 suffering from dysentery. The other 7 were probably all bilharziasis though specimens were not obtained in all cases.*

Dar am Farsha - One person complained of haematuria but no eggs were found in the specimen examined.

Soldiers - No cases of haematuria or blood in the stools.

Vaccinal State

Wadi Ma'adin - Vaccinated, 24 males and 1 female.
Had Smallpox, 32 males and 10 females.
Unvaccinated, 64 males and 4 females.
Protection 50%.

Dar am Farsha - Vaccinated, 2.
Had Smallpox, 7.
Unvaccinated, 48.
Protection 16%.

Soldiers - 15 Vaccinated and 12 had smallpox. Protection 100%.

Haemoglobin

Wadi Ma'adin - In a series of 15 tests (7 adults and 8 children) there were no severe anaemias (under 60%); the average haemoglobin was 80%.

Dar am Farsha - Anaemia was not noticeably present: no tests were done.

Soldiers - In 9 soldiers the average was 94%.

*A boy under 10 brought a typical stool streaked along the edges with mucus and blood. Microscopically eggs of Bilharzia mansoni were found; 4 adults between 15 - 45 were affected and the specimen obtained from one of these, the only female in the series, showed eggs of Bilharzia Haematobia as well as Ascaris eggs. Two adults over 45 were diagnosed clinically as cases of Bilharziasis but refused to produce specimens.

Vital Statistics. Only 11 women over 15 were seen in the whole survey. These were all from the Wadi Ma'adin section; 5 of them were in the 15 - 45 group and gave the following statistics:-

5 women in the 15 - 45 group were all married. M.R. 100%.
19 children had been born alive to these 5 women. F.R. and M.F.R. 3.8.
7 of the 19 children had died in infancy. Infant mortality rate 368/1000.
6 women over 45 were seen, all had been or were married. M.R. 100%.
24 children had been born alive to these 6 women. F.R. and M.F.R. 4.0.
One of the women had had 14 children and only two were still alive but her memory of ages at death was too vague to be of any value.
Excluding her children there are still 10 children to consider thus:-
4 children out of 10 born alive died in infancy and another died under 2 years.
Infant mortality rate 400/1000. Child mortality rate 500/1000.

Prevalence of Morbid Conditions. The table includes conditions already referred to.

Wadi Ma'adin - Fever 29 males, 1 female: Yemen ulcer 16 males: joint pains 7 males, 2 females: chronic synovitis 1 male: chronic cough 3 males, 2 females: pulmonary tuberculosis 5 males: bilharziasis 6 males, 1 female: T.B. adenitis neck 1 male: colic and dyspepsia 6 males, 2 females: scurvy and bleeding gums 5 males: ascites 1 female: heart disease 3 males: infantile paralysis 2 males: syphilis 2 males: facial paralysis 1 male: deafness 3 males, otitis media 3 males, dysentery, jaundice, haemhorrhoids, and patellar bursitis, each one male.

Dar am Farsha - Frequent colds 12. Fever 2. Chronic cough 2. Joint Pains 1. Laryngeal T.B. 1. Paralysis Agitans 1.

Comment. The examination of the people in the wadi districts of the Subeihi country reveals the following four points:-

(i) Malarial hyperendemicity in Wadi Ma'adin and malarial endemicity in Wadi am Farsha.
(ii) Intestinal bilharziasis in the Wadi Ma'adin.
(iii) An incidence of trachoma in both areas well below the average for the Protectorate.
(iv) An infant mortality rate in keeping with other areas; in spite of the small number of women seen, therefore, it may be taken as reliable.

2. Nutrition

Physique. As has already been noted the physique in Wadi Ma'adin and in Dar am Farsha is less than satisfactory. The diet of the two areas is very similar and in this section they are considered together.

Diet. Principal foodstuffs:-

Ghorba or red millet (Sorghum vulgare), dukhn or bulrush millet (Penesetum) and hind or Indian corn (Zea mays). These are used in the form of bread or in the form of porridge.

Seasonal Variation. In summer a certain amount of dijr or cowpea (Vigna) is eaten.

Consumption of meat - rare
fish - dried salted sardines are eaten with each meal, about ½ pint per day. On market days other salted fish is available.
milk - most people keep sheep or goats or a cow, and for nearly all some milk is available.
green vegetables - once a week on market days the people have radishes, radish tops and leeks. Very little fruit is eaten but in the season guavas and bananas are available on market days: qat and mulba are both in common use.
salt - adequate.

The people usually feed twice a day, at 9 a.m. and just before sunset i.e. between 5 and 6 p.m.

Comment. The relative values of the available grains might be worked out and local agriculture planned accordingly. In the absence of meat protein the value of the dried sardines should be assessed and the consumption of dijr encouraged. Milk drinking might be increased by simple instruction in its value. The occurrence of rickets stresses the need for such instruction.

Vegetables rich in vitamin C could be grown in abundance locally. The frequent occurrence of spongy gums and at least one case of scurvy illustrates this need.

Diet of the Soldiers

The Government Guards - White wheaten flour and rice were issued as their staple foods. Rather more than one pint of milk per man was issued each day. They had meat once a week and had the same weekly supply of green vegetables as the people of the district. They did not eat the dried salted sardines.

The Lahej Soldiers - Barley bread and rice were issued as the staple foods. They had no regular issue of milk, but sometimes bought it. Salted fish, other than sardines, was issued to them regularly, but they had no meat. Their supply of green vegetables was very poor.

The physique of these soldiers was much better than that of the tribesmen of the district.

3. Water Supply

(This and subsequent paragraphs apply to Wadi Ma'adin only and especially to Ghariq. In Wadi am Farsha the water supply is from wells but these were not examined carefully and no full notes were taken).

Source of supply. (i) From small wells, the best of which is Bir am Baha.
(ii) From the ghail or permanent stream in the wadi.

Bir am Baha, at the foot of Tor am Baha, is on the west bank of the Wadi Ma'adin opposite the coffee shop which marks the frontier post on the Aden - Mafalis road. A 2 ft. square hole in the well head leads to water 34 ft. from the ground level. The depth of the water in the well at the time of the examination was 3 ft.

Accessibility of sources. Water has to be carried long distances, in some cases as much as two miles. The channel of the ghail is changed at regular intervals so that a village may have running water available for 4 - 5 days and then for a week have to depend on the nearest well.

Protection afforded to sources. (i) To the ghail - nil.

(ii) To the wells - these are stone-lined but not plastered. Bir am Baha has a plinth of granite blocks about 10 ft. square around the well head, and this is raised about 2 ft. above the wadi bed.

Existent contamination. Wells - the well head is stamped and muddied by animals and fouled by animal droppings. The water is turbid. The stream - the water is clear and pleasant to look at but the stream is full of "life". Insect larvae, water boatmen, tadpoles, snails, and leeches abound. Animals drink at the ghail and foul it; the people probably foul it also.

Possible future means of contamination. Floods, epidemic intestinal diseases etc.

Approximate amount of water available. This would seem to be adequate - even in summer the wells do not go dry.

Comment. Contamination seems to be almost maximal, but adequate protection would seem to require very far-reaching reforms. Individuals should be encouraged to boil their water. In the presence of bilharziasis even washing water should be treated before use. In such matters the District Officers and the station troops could be an example to the neighbourhood.

4. Sanitation

Disposal of domestic and dry refuse. Rubbish dumps are heaped up on the hillsides. In a number of cases they are 20 ft. high. No attempts are made to burn these heaps or to destroy them in any other way.

Disposal of excreta. No provision is made in the houses for the reception of solid excreta. In a few of the bigger Dars a special structure is built out from the wall to be used as a urinal. It was explained that this is only for use during tribal troubles when anyone appearing outside during daylight is liable to be shot at (see housing).

Final disposal. By natural disintegration.

Public conveniences. It will be obvious that in such a village every likely bush, every dip in a rubbish heap and every convenient rock becomes a public convenience and is the reppository of excreta.

Comment. The entire lack of sanitary provision in the village leads to a very considerable degree of nuisance and this must be worse in wet weather.

The degree of danger to the public health must be considerable especially to children playing on the rubbish heaps. Flies and dust will be even more dangerous than usual in surroundings such as those described. The stream must be very readily contaminated and in presence of the appropriate mollusc the spread of bilharziasis easy. The occurrence of other intestinal troubles as discovered by the survey is less than the sanitary conditions might have led one to expect.

5. Housing

The village. El-Ghariq is one of a series of villages in and overlooking Wadi Ma'adin. These villages from Boreh to Tawilyah probably house 1,000 people. (The following villages in this area were seen and their populations estimated: El Ghariyiq 200, Boreh 100, Dar Umberatain 100, Dar Saleh and Khofeiq together 100, Ghariqah 100, Habil Es Sabt 100, Tufih 100, Tawilyah 100, and Tor am Baha 50).

El Ghariq is perched on the top and straggles up the north east slopes of a ridge of granite which rises to 200 ft. above the Wadi Ma'adin on its right or west bank. The site, naturally very steep and irregular, is rendered even more so by the many and high rubbish heaps between the houses. The houses near the top of the hill are mostly of stone, while many of those lower down are of palm leaf. The village lies about half a mile from the main wadi bed and is separated from it by fields of millet which are dotted with palm trees. On the side of the hill away from the wadi the houses on the crest look down on to Habil Es Sabt and over to Wadi Ma'abak. Here too there are fields of millet, Indian corn and sesame but the palm trees are fewer. A flat part of this area, about the size of a football field, is reserved for Saturday market (see plan).

Materials used in building - Stone, palm branches and tamarisk branches.

The houses - There are two main types of house in the village:-

(i) Drystone houses - i.e. of unplastered and uncemented stone.
(ii) Palm huts - these are palm branches on a framework of tamarisk.

The drystone houses may be simple single-roomed dwellings or larger two or even three-storeyed houses of five or more rooms. The single-roomed stone houses may be rectangular, as in the plan, or circular. In either case the roof may be of palm leaf or of plastered brushwood.

Outside the house there is usually a stockade or, in the case of the larger houses, a walled-in courtyard (see plan).

Houses. Average number of rooms - poorer class 1.
wealthier class 3.
Dimensions of sleeping quarters - poorer class 14 ft. circle.
- wealthier class 8 x 12 ft.
Average number occupying a sleeping room - poorer class 4.
- wealthier class 2 - 6.

Ventilation. In the poorer palm leaf house, apart from the air which gets in through the brushwood, the door is the only means of ventilation. The one-roomed stone dwellings are quite dark and the door here too is the only means of ventilation.

Even in the larger dars ventilation is very poor and the houses are almost dark. The main rooms may have 1 - 3 windows but these are only 6" square. This state of affairs is again related to the chronic state of tribal strife.

Presence of livestock in houses. In houses of two or more storeys (dars) the lower floor is occupied by the livestock - principally sheep and goats but sometimes also a cow. Hens occupy special baskets which are kept on the roof.

In single-roomed houses the livestock are usually kept in the courtyard.

Comment. As the people become accustomed to living at peace with their neighbours better house planning should be possible. This should introduce sound schemes for ventilation and sanitation.

6. Special investigations relating to Malaria

General. The district in which the main survey took place (Wadi Ma'adin) is representative of those Subeihi areas in which there are perennial streams. The people are now employed mostly in the cultivation of the land but raiding the caravan routes was, until recently, an important secondary source of livelihood. They are economically just above subsistence level at present, but this could become a relatively wealthy district.

The people seen in the Wadi Ma'adin group all belonged to the district. Immigrants are very few and even Hijris do not seem to frequent this area. There is, however, free communication with Aden on the one hand, and with Mafalis in South Yemen on the other, as the main trade route between them passes up this wadi.

Before our visit quinine was not used amongst the people but supplies were being sent, and the local dispenser has now some at his disposal.

The general standard of health and nutrition was less than satisfactory.

Mosquitoes. Examination of the domestic water pots and of the wells failed to reveal any breeding places, but many larvae were found in the irrigation channels and in the ghail itself.

The types of breeding places in which larvae and pupae were found were - the reedy edges of the ghail, pools and backwaters in the ghail and pools left in the temporary irrigation channels.

Adult mosquitoes were bred from pupae and sent home for identification. The London School of Hygiene and Tropical Medicine reported that three types of anopheline and three of culicine mosquito were represented as follows:-

Anophelines	(i)	A. dthali
	(ii)	A. pretoriensis, etc.
	(iii)	A. gambiae
Culicines	(i)	C. aethiopicus
	(ii)	C. sinaiticus
	(iii)	a species of C. decens

An adult anopheline caught in a house in the act of biting was identified as A. gambiae.

Comment on observations on Malaria. Malaria control in this area is likely to prove difficult unless undertaken on a large scale. The breeding places in the irrigation channels could, however, be diminished by education in proper irrigation systems, and by better care of the channels. The ghail could be cleared of its weeds periodically and the pools and backwaters eradicated.

Special investigations relating to Bilharziasis. Planorbis and other molluscs usually associated with bilharziasis were not found in spite of repeated search. The only molluscs found were slugs and tall narrow shelled snails whose whorls narrowed from base to a sharp pointed apex. The height of these shells was from ½" - 1".

They were identified as Melanoides Tuberculata. The snails were found in the weeds of the ghail and in the irrigation channels.

Further search for snails will need to be undertaken and perhaps special investigation to discover whether the snails found could act as hosts for bilharziasis.

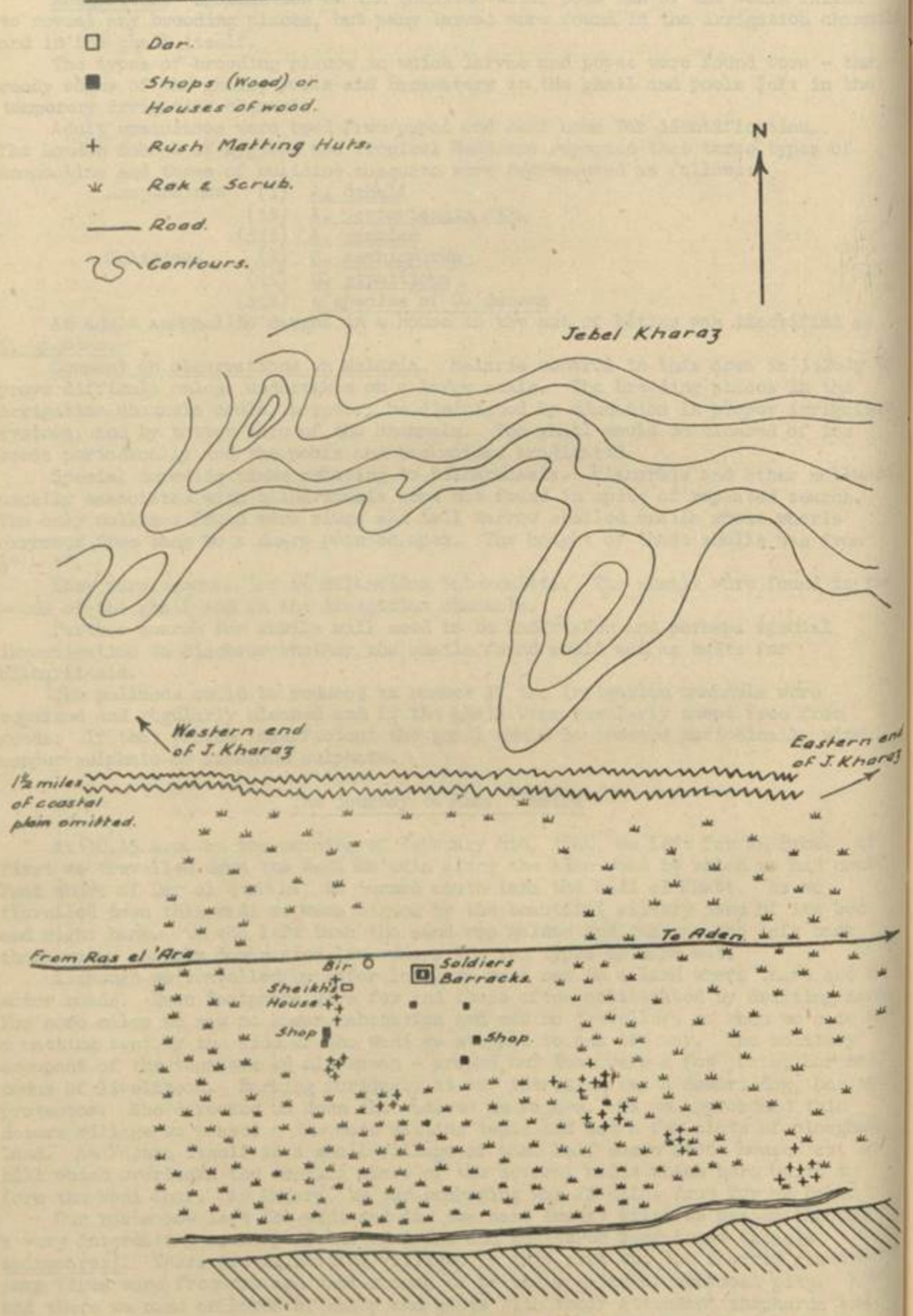
The molluscs could be reduced in number if the irrigation channels were repaired and regularly cleaned and if the ghail were regularly swept free from weeds. If that proved insufficient the ghail could be treated periodically with copper sulphate or ammonium sulphate.

The journey to Khor 'Umeira

At 10.15 a.m. on the morning of February 8th, 1940, we left Tor am Baha. At first we travelled down the Wadi Ma'adin along the Aden road by which we had come. Just short of Dar el Qudeimi we turned south into the Wadi el Khabt. As we travelled down this wadi we were struck by the beautiful silvery sand of its bed and right bank. On the left bank the sand was golden and just at the left bank there was a sharply demarcated line where the two types of sand met.

Although we travelled by motor lorry we were now in a land where there are no motor roads. Even footpaths were few and these often obliterated by drifting sand. For some miles we saw no human habitation and met no travellers so when we came upon a matting tent by the side of the wadi we stopped to ask the way. The solitary occupant of the tent was an old woman - around her tent were a few goats, her sole means of livelihood. Barking furiously at our intrusion was a desert dog, her sole protector. She directed us down the wadi to am Fajara. As we approached this desert village we passed a few more matting tents and saw a few plots of ploughed land. Am Fajara itself is a small village of some half dozen stone houses set on a hill which overlooks the meeting place of the several wadis which here unite to form the Wadi Dhar. Am Fajara, by our reckoning was 22 miles from Tor am Baha.

Our route now left the wadi and for the next twenty miles we passed through a very interesting country of tufted grass and scattered Sumr trees (Acacia spinocarpi). There are no settled villages in this area but the charred remains of camp fires were frequent and what seemed to be the remains of charcoal pits. Here and there we came on herds of sheep and goats with their attendant shepherds and shepherdesses. At Bir Misda'iya some herdsmen were watering their flocks so we stopped and spoke to them. The men were fine healthy upstanding fellows. Their particular flock was of camels. They told us that they "follow" their camels from well to well and from pasture to pasture. They have no houses nor tents, and sleep under the bushes wherever they are. We left Bir Misda'iya forty miles from



Tor am Baha, at 2.15 p.m. and continued through similar savannah country for another five or six miles till we saw the sea and the long arm of land running out into it to form the lagoon of Khor 'Umeira.

We arrived at Khor 'Umeira about 3.15 p.m. and were cordially welcomed both by the Sheikh of the Barhimis and the Lahej soldiers stationed at Khor 'Umeira. The Sheikh made us a present of a sheep and the soldiers cleared one room of their barracks for our use.

After one night in the tent we decided to use the room in the barracks as our dwelling place because the high winds and the loose sand combined to make our tent insecure.

(b) Khor 'Umeira

The people of Khor 'Umeira are members of the Barhimi section of the Subeihis. The Barhimis are mostly nomads. The bedouins we met at Bir Misda'iya were Barhimis. Khor 'Umeira is the settled home of their Sheikh and of a subsection of the Barhimis who have become fishermen.

On the morning after our arrival we walked round the village and found that, with the exception of the Sheikh, all the people live in matting tents. These tents are pitched among the rak bushes (Salvadora persica) with their backs to the prevailing wind.

After a talk with the "heads of houses" and after counting the little tents for ourselves we estimated the population of Khor 'Umeira at 150. We saw 24 patients during our first afternoon and found the people very friendly and helpful.

Next morning after seeing a few patients at the barracks we were asked to go and see a woman in one of the tents. This turned out to be one of the several cases of "corneal blister" which will be referred to later. As we sat in the tent people of all ages and both sexes crowded in and we did a very satisfactory morning's work.

The Sheikh told us many things about himself and his people. As illustrating the former insecurity of the country he told how his grandfather went to see the Sultan of Lahej and had to pass through a "foreign" section of the tribe. On his return journey the old man was shot and killed. The Sheikh said that in those earlier days every man carried a rifle and he would shoot at any strangers in his territory and he would expect to be shot at if he went into "foreign" territory. He told too of the fate which befell any vessels wrecked on these shores. The occupants were killed and their ship was plundered. "But" - he explained - "all this is now finished by order of the British Government" and he added, piously, "praise God"!!

During the next few days at Khor 'Umeira we sometimes saw patients at one of the wooden shops and sometimes in a matting tent. Instead of carrying our medicines around from one stance to another we, when necessary, gave people prescriptions and set aside an hour before sunset to dispense these at the barracks, our headquarters. Among those seen was our first case of bejel, a case of disseminated sclerosis and one of spondylitis deformans.

After we had seen as many of the people of Khor 'Umeira as seemed likely to come willingly, we made two expeditions to neighbouring districts.

The first, Hiswa el Melika was only five or six miles away. We found Hiswa el Melika to be a village of some 60 people living in matting tents like those at Khor 'Umeira. They, too, were fisher folks. The site of their village is drier and there are fewer "rak" bushes. The only sources of fresh water for this community are scooped-out holes in the bed of the Wadi Markha which reaches the sea here. These holes are called hiswas or hisees. "Hiswa" is a common place name along this coast (see the map facing p.44). These shallow holes fill up with water, which is at first fresh but after a few days becomes salt, and then another hisee is dug.

Our second outing was more extensive and occupied a whole day. The aim was to visit Wadi Timnan and in particular to visit Ghail Hadharuf. The way lay at first round the western edge of Jebel Kharaz. For eleven miles we bumped over tufted grass amongst some of the most difficult country for motor travel we struck in the whole survey. At Huerib we entered the Wadi Timnan and three miles up the wadi came to its main village, Turan. A few miles above Turan we came to the ghail and started looking for snails and mosquito larvae. We found no snails and only a few larvae. There were several beautiful clear pools in the ghail - one was over six feet deep and in it were many large tadpoles. We found no larvae in the pools, but higher up where the edges of the ghail were weedy we caught some. The Arabs who were with us drank some of the water and said it was brackish.

Back in Huerib we saw a few patients. We noted that in addition to houses of stone, both single-and double-storeyed, there were huts of palm tree trunks.

On our return journey we followed the Wadi Timnan to Bir am Ja'tari. This was

another terrible journey for the car - over irregular and ridgy ground. At Bir am Ja'tari we turned west towards Ras el 'Ara. This took us through a fairly large village called Mahija. Here there were both huts and tents of matting. Bir Ras el 'Ara turned out to be a station of Lahej soldiers with their own wireless equipment. Bir Ras el 'Ara was the furthest west point touched during the survey.

Before leaving Aden for Khor 'Umeira we had heard that some years before there had been a number of cases of bilharziasis reported from that district. We kept a look out for evidences of bilharziasis and though we found a few cases among the people seen, the local conditions seem unlikely to cause infection and the disease may have been contracted elsewhere.

On February 16th we set out on our return journey to Aden. We had hoped to come back along the coast but the sheikh advised against this. When we persisted that it was our duty to see as much of the country as possible he pleaded with us to return by the inland route along which we had come. He assured us that if we got stuck in the coastal sands we might be very far from a well or from any human settlement. Reluctantly we agreed that it would be foolish to go against the advice of the local people and so we came back by am Fajara, Qudeimi, and am Rija to Aden.

The Subeihi survey had taken 21 days. We had covered 374 miles and seen 355 cases.

1. Examination of the people

Of a total of 133 people seen 108 were seen at Khor 'Umeira and 25 in Wadi Timman. We probably saw 60% of the total population of Khor 'Umeira. Those seen fall into the following groups according to age and sex:-

Age group	at Khor 'Umeira males	at Khor 'Umeira females	in Wadi Timman males	in Wadi Timman females
0 - 1 yr.	1	0	0	0
1 - 2 yrs.	2	2	0	0
2 - 10 "	21	10	4	1
10 - 15 "	2	1	1	0
15 - 45 "	40	11	16	3
over 45 "	12	6	0	0
Total	78	30	21	4

Occupations. In Khor 'Umeira of 62 males who told us their occupations
- 25 were fishermen
- 1 a fishporter
- 11 camelmen
- 7 soldiers (from Lahej)
- 4 shepherds
- 6 woodcutters
- 3 labourers
- 2 house servants
- 1 qadhi (i.e. Moslem judge)
- 1 carpenter

and 1 sheikh

In Wadi Timman of 16 males who gave information concerning their occupations
- 12 were landworkers
- 1 woodcutter
- 1 merchant
- 1 shepherd

and 1 sheikh

Intelligence. Of 35 returns made in Khor 'Umeira:

males	females	
13	11	were Good
7	3	Fair
1	0	Poor

Of 7 returns made in Wadi Timman:

3	0	Good
3	1	Fair
0	0	Poor

Literacy. Khor 'Umeira 1, Wadi Timman 2.

Cleanliness. At Khor 'Umeira

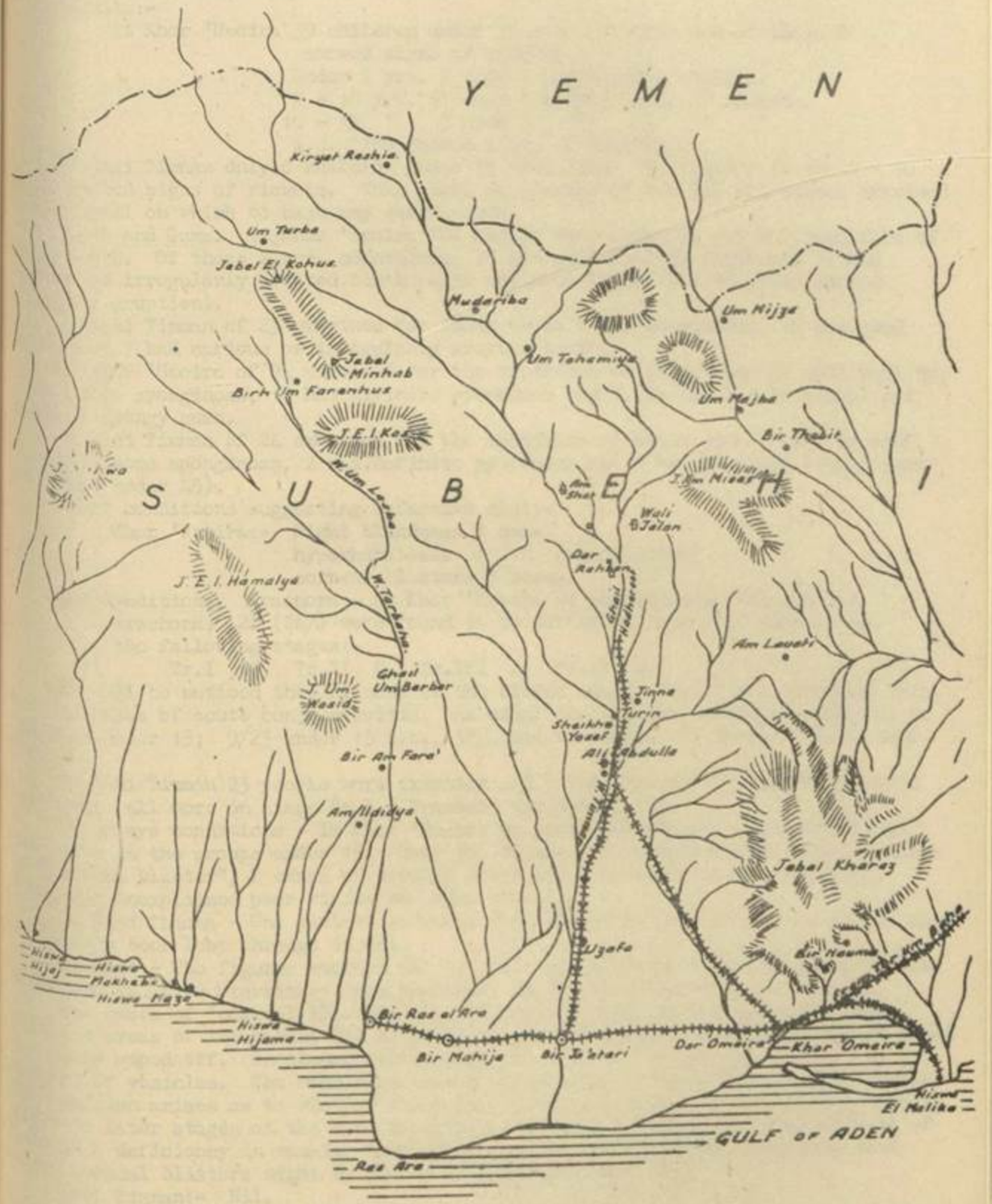
	Head males	Head females	Head %	Body males	Body females	Body %	Clothes males	Clothes females	Clothes %
Good	18	6	= 22%	19	5	= 22%	16	5	= 21%
Fair	56	22	72%	55	23	72%	47	22	69%
Poor	4	2	6%	4	2	6%	7	2	9%

of the male children between 2 and 10, 8 were no clothes
" " " " under 2 1 " " "

Wadi Timman

	Head males	Head females	Head %	Body males	Body females	Body %	Clothes males	Clothes females	Clothes %
Good	3	0	14%	3	0	14%	5	0	25%
Fair	16	1	81%	16	1	81%	12	1	65%
Poor	1	0	5%	1	0	5%	2	0	10%

1 male child in the 2 - 10 group wore no clothes.



Physique

	Khor 'Umeira			Wadi Timnan		
	males	females	%	males	females	%
Satisfactory	37	14	= 49	8	0	= 36
Less than satisfactory	31	14	= 43	9	0	= 41
Poor	7	2	= 8	3	2	= 23

Signs Suggesting deficiencies of Diet

Rickets:-

At Khor 'Umeira 39 children under 15 were examined and of these 2 showed signs of rickets.
Under 2 yrs. 5 seen 1 very marked rickets.
2 - 10 yrs. 31 seen 1 showed signs of rickets.
10 - 15 " 3 seen 0 " " " "
i.e. 2/39 showed signs of rickets.

In Wadi Timnan only 6 children under 15 were seen. Of these 1 in the 2 - 10 group showed signs of rickets. This gives an average of 1/6 but the number examined is too small on which to base any conclusions.

Teeth and Gums. At Khor 'Umeira 101 people were examined for the condition of their teeth. Of these 2 were edentulous, 70 had good healthy teeth and 29 had carious or irregularly erupted teeth (4/30 children in the 2 - 10 group showed irregular eruption).

In Wadi Timnan of 23 examined for their teeth 1 was edentulous, 15 had good teeth, and 7 had carious or irregularly erupted teeth.

At Khor 'Umeira of 94 examined for the condition of their gums 49 were healthy, 39 had some sponginess, 10 had definite pyorrhoea and 1 (in the 2 - 10 group) had bleeding spongy gums.

In Wadi Timnan of 24 examined for the condition of their gums 5 were healthy, 16 showed some sponginess, 2 had definite pyorrhoea and 1 had bleeding spongy gums (an adult under 45).

Other conditions suggesting defective diet:-

Khor 'Umeira:- Night blindness 1 case
hyperkeratosis 1 " (phrynoderma)
corneal blisters 3 cases.

Eye Conditions. Trachoma - At Khor 'Umeira 90 people were examined for trachoma; 22 (24%) were found to be suffering from that disease in the following stages:-

Tr.I 16, Tr.II 0, Tr.III 4, Tr.IV 2.

It will be noticed that no case of the florid stage (Tr.II) was seen and there were no cases of acute conjunctivitis. As usual the highest incidence occurred in children under 15; 9/23 under 15 i.e., 39%, had trachoma. Of these Tr.I claimed 8 cases.

In Wadi Timnan 23 people were examined and 5 were found to be suffering from trachoma; all were in stage Tr.I. Trachoma incidence, 22%.

Other eye conditions - In Khor 'Umeira no other pathological eye conditions were seen in the groups under 15. Over 15, 10 cases of cataract were seen, 3 cases of "corneal blister", 2 cases of corneal ulcer and 2 cases of corneal opacity; 1 case of unexplained poor vision was also seen.

In Wadi Timnan - One patient suffered from acute conjunctivitis and in one case an eye had been lost through injury.

Comment - The figures confirm the opinion already formed that trachoma is less prevalent in Subeihi territory than elsewhere in the Protectorate.

The cases of "corneal blister" all presented a very similar picture. The affected areas of the cornea had a frothy appearance which looked as though it could be easily wiped off. On closer examination the area was seen to be covered by a cluster of vesicles. The condition seemed to give the patient very little trouble. The question arises as to whether the cases of corneal ulcer and of corneal opacity might be later stages of the same condition. In view of the well known effects of vitamin A deficiency in causing keratomalacia I have tentatively suggested that these corneal blisters might be due to a dietetic deficiency.

Wadi Timnan:- Nil.

Heart Conditions. Khor 'Umeira - 1 case of mitral systolic murmur (15 - 45 group)
Wadi Timnan - no cases of cardiac abnormality were noted.

Lung Conditions. Khor 'Umeira - Asthma 1 case
Cough 7 cases (no definite signs in the chest)
Wadi Timnan - Cough 1 case (" " " " " ").

Skin Conditions. Khor 'Umeira - warts 2 cases, fungus infection 1
hyperkeratosis 1, bahaq 1
acne vulgaris 1, leucoderma 1
septic blisters with adenitis 1 case.
Wadi Timman - septic spots 2 cases, acne vulgaris 1
bahaq 1 case.

Deformities and Bone Conditions

Khor 'Umeira - 1 amputation for mycetoma
1 fibro-lipoma of the back
1 ganglion of the foot
1 thickened distal epiphysis of radius and ulna (infant son of the patient with bejel).

Wadi Timman - 1 umbilical hernia (symptom free)
1 kyphosis (the case of spondylitis deformans).

Evidences of Malaria. Khor 'Umeira - Splenic enlargement was noted in 5 of the 105 subjects examined. Of these 1 adult also had enlargement of the liver; his condition was probably not due to malaria.

In the 2 - 10 group 2/30 children had enlarged spleens; Splenic index under 7%
The amount of enlargement was - 1 case 1 finger below costal margin.
1 " 2 fingers below margin.

Even in the adults with splenic enlargement the amount of enlargement was not great. The patient already referred to with concomitant enlargement of the liver had a 2 finger enlargement. The other two adults had a 1 finger enlargement each.

Wadi Timman - Splenic enlargement was noted in 12 of the 23 subjects seen. Unfortunately only 5 children in the 2 - 10 group were seen; of these 1 had a 1 finger enlargement of the spleen. The amount of enlargement in adults was considerable - 4 cases to 1 finger below the costal margin
4 " " 3 fingers
1 case " 4 "
2 cases " 5 " or more.
Adult spleen rate 52%. Adult enlarged spleen 2. 7 fingers.

Evidences of Bilharziasis. Khor 'Umeira - An outbreak of bilharziasis amongst troops at Khor 'Umeira is said to have occurred in 1934 or 1935. The complete absence of fresh water channels seemed to make this unlikely, but careful enquiries elicited the following -

(a) One of the Lahej soldiers had been in the garrison at the time and declared that he and a number of his comrades went down with haematuria.
(b) 1 boy in the 10 - 15 group complained of passing blood in his urine and bilharzial eggs were seen in the specimen he produced.
(c) 1 girl in the 2 - 10 group was said to pass blood and mucus in her stool. No eggs were found in the specimen.

Turan - 1 woman in the 15 - 45 group suffered from haematuria,
1 man in the same group was said to pass blood and mucus in his stool.

Vaccinal State. Khor 'Umeira - vaccinated, 14 males, 0 females,
had small pox , 6 males, 0 females,
Unvaccinated, 52 " 29 "
protection under 20%. No females were protected. Male protection 39%.
Turan - vaccinated 4, unvaccinated 11.

Vital Statistics. Khor 'Umeira - 11 women in the 15 - 45 group were seen. All had been married; 1 was a widow; 1 was childless. Marriage rate 100%.
60 children had been born alive to the 11 women F.R. and M.F.R. 5.4.
Of 60 children born alive 10 had died in infancy.
Infant mortality 166/1000.
Of 60 children born alive 14 had died under the age of 5.
Child mortality 233/1000.
6 women were seen in the over 45 group all had been married, 1 was a widow.
Marriage rate 100%.
45 children had been born alive to these 6 women.
Fertility Rate and Married Fertility Rate 7.5.
Of 45 children born alive, 7 had died in infancy.
Infant mortality 155/1000.
Of 45 children born alive, 8 had died under the age of 5.
Child Mortality 178/1000.

If the two groups are combined we have to deal with 17 women and 105 children, yielding the following figures
Marriage rate 100%. Fertility and Married Fertility Rate 6.2.
Infant Mortality 162/1000 and Child Mortality 209/1000.

An infant mortality representing only one child per married woman must be regarded as unusually low in Arabia.

Wadi Timman - In Wadi Timman only 3 adult women were seen. They were all in the 15 - 45 group. All were married; Marriage rate 100%. 20 children had been born alive to these 3 women; F.R. & M.F.R. 6.6.
Of 20 children born alive 6 had died in infancy; I.M.R. 300/1000.

Prevalence of Morbid Conditions

Khor 'Umeira -	Cough	11	fever	6	otitis media	4
	Joint pain	8	dyspepsia	4	fibrositis	3
	colic	3	sore throat	2	facial paralysis	2
	alveolar abscess	1	syphilis	1	synovitis	1
	mycetoma	1	bronchitis	1	asthma	1
	acute rickets	1	stomatitis	1	bejel	1
	chicken pox	1	haematuria	1	enlarged liver	1
	disseminated sclerosis	1	ascites	1	blood in stool	1
Wadi Timman -						
	fever	4	colic	2	bullet wound	1
	otitis media	3	bejel	1	haematuria	1
	blood in stool	1	cough	1	joint pains	1
	spondylitis deformans	1			dyspepsia	1

Comment. In spite of the trying conditions under which the people of Khor 'Umeira live one is struck with their good health in comparison with the other places visited in the Protectorate. The following points are worthy of special mention

(i) The low infant mortality rate.
(ii) The low trachoma rate.
(iii) The incidence of malaria and bilharziasis is almost negligible.
(iv) Tuberculosis is apparently absent.

Wadi Timman approximates more to the Subeihi districts already visited; this is to be expected from its geographical position.

2. Nutrition (Khor 'Umeira only)

Physique - Satisfactory.

Diet - Principal Foodstuff fish. Cereals are brought from inland districts and stored. Indian corn and the various types of millet are the main cereals. They are used as porridge and as bread.

Meat is rarely eaten.

Fish is abundant and is used both fresh and as dried salted sardines. A man may eat as much as 2 lb. of fresh fish per day.

Milk There are wide individual differences, depending on occupation; Camel herds may take as much as 2 quarts a day, goat owners just enough to put in their tea. Most of the other people do not drink milk.

Salt is adequate.

Vegetables and fruit are not available

Most people feed twice a day, at 8 a.m. and 8 p.m., but some feed only once.

Feeding customs. Children are usually kept on the breast till over two years old. A child who looks thin is given clarified butter and sugar in addition; otherwise the only additional food is bread. This may have been the chief factor in bringing about rickets in the acute case seen.

Pregnant Women. Milk, chicken or meat are given if the husband can afford it. Attempts are made, as far as possible, to meet the vagaries of the pregnant woman's appetite.

The abundance of fish may supply most of the accessory food factors but there would seem to be a definite shortage of vitamin C in the diet.

Adequate supplies of milk, eggs and fresh vegetables should be procured for the community. The milk and eggs could be produced locally, the vegetables might be taken in exchange for sardines sold at the inland markets.

3. Water Supply (Khor 'Umeira only)

Source of supply. The only well is situated at the northern extremity of the settlement between the Sheikh's house and the barracks.

At the time of the survey it was 40 ft. to the water and there were 3 ft. of water in the well. The well head is 5 ft. across.

Accessibility of source. The most distant tent in the village was, at the time of the survey, about half a mile from the well. Water is carried in goats' skins and in earthenware pots. Each person supplies his own bucket and rope.

Protection of the well. The well is lined with stones but not plastered. A circle, about 4 ft. wide, of rough stones surrounds the well head. The interstices between the stones are puddled and fouled by the droppings and the stamping of animals brought there to drink.

Existent contamination. The water is clear but contained "bloodworms", probably larval chaoborinae.

Possible future contamination. Seepage into the well from the foul puddles about the well head, sand storms, occasional heavy rainstorms.

Adequacy and requirements: The well seems inexhaustible by the demands of the present population. They use about 2 gallons per head per day.

Comment. The water supply is fairly satisfactory, but could be improved by
(i) better protection of the well head.
(ii) lining the well with cement plaster.

The sterilising action of the sun on the puddles about the well head and on the sand blown into the well must help to keep the well fairly free from contamination.

4. Sanitation (Khor 'Umeira only)

Disposal of refuse. There is no trade refuse. Domestic refuse is small in amount and when thrown out quickly dries in the sun and is covered by loose sand.

Houses do not occupy permanent sites.

Human Excreta. No provision is made in the houses for the reception of excreta. Bushes, sandhills and the sea shore are used as public conveniences. Final disposal is left to the forces of nature. The sun and the wind in the first two cases and the ebb and flow of the sea in the other.

In spite of this primitive state of affairs there is very little nuisance and perhaps not very much danger. This can be attributed to the smallness of the community and lack of crowding, the drifting sand, the drying power of the sun, and the occasional moving of the tents from one site to another.

5. Housing (Khor 'Umeira only*)

The village. Khor 'Umeira is one of a series of settlements on the Subeihi coast east of Ras el 'Ara. The population of the whole district is probably under 700:- Khor 'Umeira 150, Hiswa Melika 60, Bir Ja'tari, Bir Mahija, Uzafa and other settlements to Ras el 'Ara about 500.

Khor 'Umeira is properly the name of the lagoon but is also used as the name of the village. Sometimes, and more accurately the village is called Dar 'Umeira and sometimes Bir 'Umeira. The village lies on the shore in an area rich in rak bushes. Behind it is a narrow coastal plain and then the great mass of Jebel Kharaz.

The dwellings. With the exception of the Sheikh's house and the barracks, which are of stone, all the other dwellings are matting tents of a uniform pattern. The materials used are rush matting, jute sacking, rough branches of trees for tent poles and rope for guys. The tents are moved from time to time and new sites are chosen. The choosing of the site is done with considerable skill. Usually a sand dune and a clump of rak bushes lie behind the tent in the direction from which the prevailing winds are expected. Half of the front of the tent is left quite open. The actual floor space inside the tent is about 8 x 10 ft. and the average number of persons occupying such a tent is five. Often, especially in the hot weather some of the "occupants" sleep outside in front of their tent. Some families own more than one tent.

Ventilation. The customary construction of the tent makes adequate provision for ventilation.

Livestock etc. Livestock is not actually kept in the tent but the goats wander in and out and leave their droppings. Chickens are kept in baskets which are brought into the tent at night.

6. Special investigations relating to Malaria

General. Khor 'Umeira is taken as representative of those Subeihi areas on the coast where people live mainly by fishing and where rainfall is scanty. The people live just on the subsistence level. Their capital assets are practically limited to their few goats and hens, or in a few cases to their camels. The people

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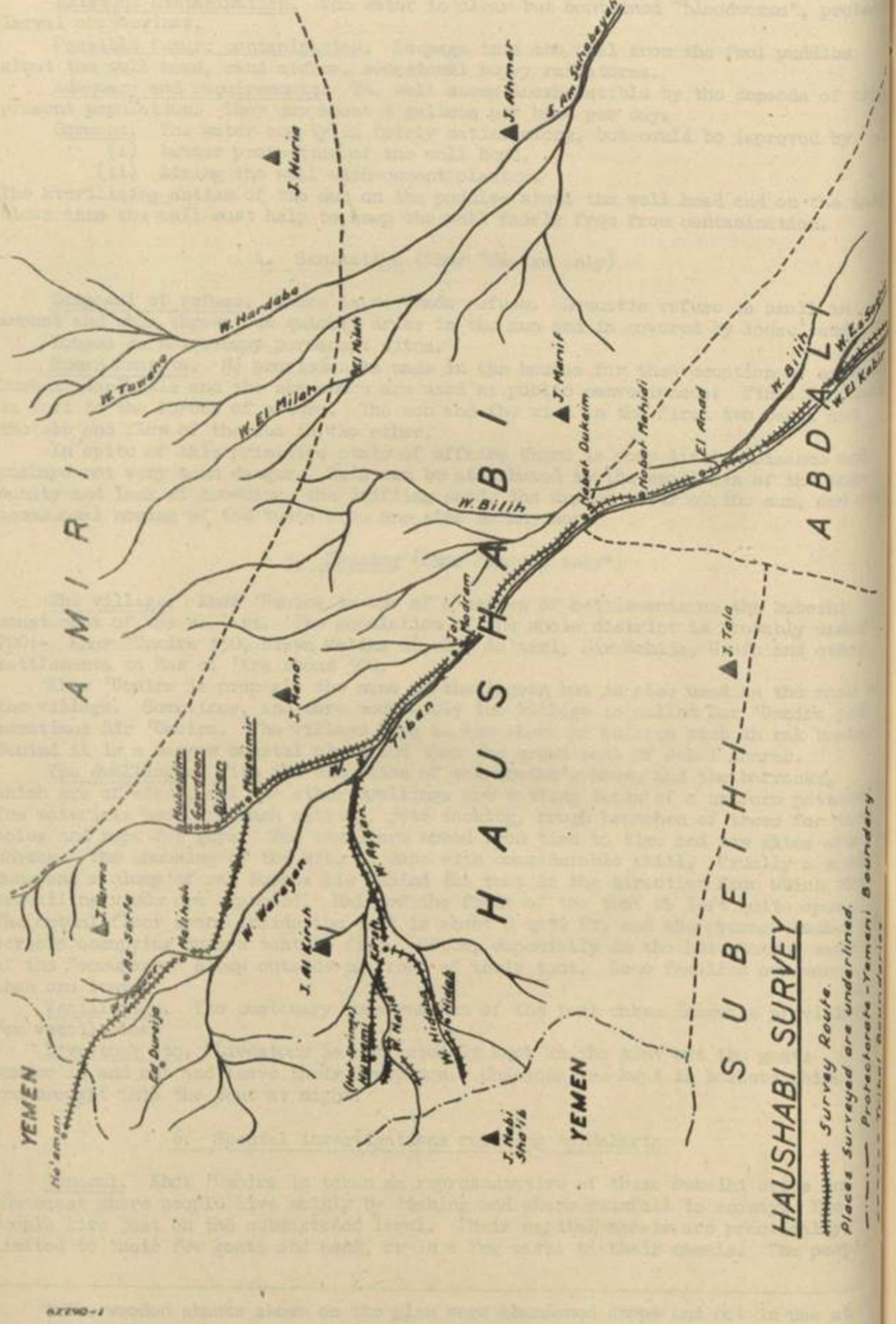
* The wooden shacks shown on the plan were abandoned shops and not in use at the time of the survey.

At Turan we saw several houses built of palm tree trunks. The trunks were dug firmly into the ground and placed as close together as possible. The interstices between the trunks were plastered with mud.



seen belonged to the district and to the one tribe and subtribe. The only exceptions to this were the seven Lahej soldiers and two officials - a qadhi and his clerk. This little community has very little communication with the outside world except through its camel transport of dried sardines inland especially to Lahej and sometimes by sea to Aden - a journey which in favourable weather takes one day. There is very little evidence of malaria in Khor 'Umeira and the people do not take quinine. The general standard of health is satisfactory.

Mosquitoes. The nearest breeding place discovered was in Ghail Hadharuf in Wadi Timnan and in the wadi villages malaria does occur. Mosquito larvae were sent home from Ghail Hadharuf. They were identified as anophaline larvae but were too immature for full identification.

No adult mosquitoes were found.

The typical breeding places in Ghail Hadharuf were the edges of weedy stagnant pools. Larvae were not found in the clear pools or in the running stream.

Comment. The occasional wet seasons about Khor 'Umeira leave pools which might become infested by mosquitoes. The wet weather in the hills sends down flood waters in Wadi Timnan, Wadi Markha and the many other wadis on this coast. Pools in these wadis might become infested and villages formerly free from malaria be violently attacked. If our observations are right it would seem an easy matter to eradicate mosquito breeding places in Ghail Hadharuf. There is another ghail within easy distance of the coast - the Ghail am Barber in the Wadi Tarbaha. It is at least possible that if breeding places in these two ghails could be eradicated the whole Subeihi coast would be safe from malaria.

7. Special investigations relating to Bilharziasis

An outbreak of urinary bilharziasis is said to have occurred among soldiers at Khor 'Umeira in 1935. The outbreak was supposed to be caused by bathing in water from the well. One of the soldiers who contracted the disease at that time was in the Khor 'Umeira garrison at the time of the present survey. He said that the outbreak occurred in the hot weather and that there were seventeen cases.

One of the samples of urine examined on the present survey contained degenerated bilharzial eggs but the patient had been in the vicinity of Wadi Timnan and may have become infected there.

Molluscs. No snails were found either at Khor 'Umeira or in Ghail Hadharuf.

The Haushabi Tribal District (See Map)

Introduction

We set out for the Haushabi country intending to survey two districts:- first, Museimir and villages on the Wadi Tiban above the capital, and then villages in Wadi Natid and Wadi Hidaba, tributaries of Wadi Tiban. The second part of this plan took us into another of Carter's areas. Kirsh, where we then stayed is actually an Abdali post but, keeping to geographical rather than political divisions, we have called the whole area Haushabi.

This original plan was later supplemented. On our return from the Amiri country the opportunity offered to spend some time at El Milah, one of the drier districts in Haushabi country. The results of that survey are also presented here.

Geography of the Haushabi tribal district

The Haushabi country is a large sprawling area of irregular outline. Roughly it forms a quadrilateral athwart the map with its longer axis running from W.N.W. to E.S.E.

The W.N.W. boundary forms the border with the Yemen, while the E.S.E. is separated from the sea by the Fadhli country. On its south the Haushabi country is bounded by the Subeihi and 'Abdali countries and on the north by Amiri and Lower Yafa'i lands. The north-west part of Haushabi territory is drained by the Wadi Tiban and its tributaries and is therefore fertile and comparatively populous. For the rest Haushabi lands are dry and mostly barren though here and there capable of supporting herds of sheep and goats. The people are agricultural and pastoral. All through the area one finds the pastoral people, while the agriculturalists are confined to the wadis.

The country is ruled by a Sultan whose capital is at Museimir on the Wadi Tiban.

Sultan Siroor* is a well disposed and kindly Sultan but the task of ruling his turbulent tribesmen is not easy. On an earlier visit to his capital the visiting

* Since died and followed by his son Muhammad

doctor found him "at war" with the people of Jol Madram. Jol Madram is on the main road and there the Sultan's man levies customs. On this occasion the Sultan's agent, finding the job, lucrative, decided not to pay over his takings to the Sultan and persuaded the village people to rebel. The Sultan therefore marched his army, 25 strong, against the rebels. They occupied the village, set the huts alight and returned to Museimir having vindicated their master's honour.

About this same time the doctor was sitting at his tent door with the Sultan drinking tea. The camp site was on a slight eminence overlooking Museimir. They were talking quietly when a drum roll sounded from the castle below. Without any formal farewells the Sultan leapt up and ran down the hillside. A tribesman had just come in to report the finding of the Sultan's herdsman bound and gagged. The herdsman, on being released, reported the theft of the Sultan's whole herd of sheep and goats by Subeihi raiders. In a few minutes the Sultan's soldiers were off in pursuit of the Subeihis along the path indicated by the herdsman. Now and again during the afternoon shots were heard in the hills, and about sunset the triumphant army returned, driving before them a great flock of animals. They had not recovered their master's flock but, having chanced upon another Subeihi, they took his flock and brought it to the Sultan to replace the flock he had lost. Unfortunately the Sultan had some kind of agreement of friendship with this particular Subeihi, so the flock was returned to him with apologies.

The Haushabi tribal dispenser was among the first of these dispensers to receive training. The primitive state of his people was well illustrated shortly after he returned from his first period of training and started work amongst them.

He was called in to see a very sick woman, wife of a leading tribesman. When the woman died the dispenser had to take to the hills. He lived some days in a cave with his rifle between his knees in case the dead woman's relatives would find him and make him a victim of a blood feud. Ultimately a messenger from the Sultan came out to him and assured him that all would be well. There was to be no blood feud as a result of his patient's death.

This dispenser was still in Museimir at the time of our visit on the survey and did much to help us.

The journey to Museimir

We left Aden about 1 p.m. on March 2nd, in a lorry. As there had been some rain we expected the sand between Sheikh Othman and Lahej to be firm and we hoped to reach Museimir by sunset. There had, however, been more rain up country and, though our run to Lahej was good, we found the wadi above Lahej unfordable.

We decided to camp for the night and make the crossing in the morning. Overnight the river fell some three feet and we crossed without incident. The road up the Wadi Tiban to Jol Madram is fairly good. It is part of the main road between Aden and Ta'iz and on to Hodeidah and San'a. Just north of Jol Madram we left the main road and cut across country on a much rougher road to Museimir. We arrived there about noon. The Sultan received us most cordially and gave us a room in his castle. Next day we put up our tent in an open space in the village and began work.

(a) Museimir

In the first two days we saw about 100 cases. In a village whose population seemed to be about 400 this seemed fairly good, but very few of these were women. In fact, during our whole stay in the district we managed to see twelve females only.

In spite of the prevalence of malaria and the abundance of adult mosquitoes in the houses we could find no larvae in the domestic water pots so we set aside a day to go hunting along the river.

Museimir is set on a cliff high above the wadi but the people have to go down into the valley to attend to their fields and to get their water. We collected mosquito larvae and snails in case any might be carriers of bilharziasis. The larvae were not so plentiful as we had expected and we attributed this to the recent rains flooding out many of the breeding places.

On our sixth and seventh days in Museimir we made expeditions up the river to see some of the villages there. In this way Jowdun, Dijran and Mukeidim were visited. Our dispenser was obviously well known and quite as well liked in these villages as in his own. He had started certain public health measures which he pointed out to us with pride. He had persuaded the villagers to have their rubbish dumps further from their doors than formerly. He had instituted the habit of having these dumps set on fire at regular intervals. In Museimir itself he had

built a public latrine. This was just a wall of stones three feet high. The wall had wings at either end and gave a minimum of privacy, but it could hardly be called an unqualified success and it stank to heaven. It was however at a distance from the village and showed, we thought, a certain amount of initiative and laudable, though misguided, intention in the dispenser.

We completed our week at Museimir by visiting homes, making notes on sanitation, food and water supply. Thereafter we packed up and prepared to move on. We were just getting our equipment taken down to the car when the Sultan's son came to us and asked as a special favour that before we went would we go and see a sick Seiyid at a place called No'oman. It was explained that this Seiyid was chief holy man of the district, all the people respected him and the Sultan himself depended a great deal on his blessing for the smooth ruling of his people. From what the young Sultan said the place seemed to be quite near and as his father had been very good to us we decided to go.

When we were ready to mount and leave, it became clear that the place was further than we had expected. On the camel provided for our baggage we saw our camp beds and a very considerable box of provisions, though it was quite early in the day.

By midday we approached a place called Melihah, in the Wadi Faqir, which we were able to identify on the map. Here we were told that we were about half way. We arrived at No'amen at about 4 p.m. Before us lay a great mountain mass called Am Amma well inside Yemeni territory. The seiyid we had come to visit proved to be a very sick man indeed but very hospitable. After we had examined him and prescribed medicines for him he had the room next to his own cleared out, and there we spent the night. Next morning the Seiyid tried to persuade us to stay on but, after being assured that the medicines we had given him were all that we could do for him, he consented to our leaving. We got back to Museimir shortly before sunset. The Sultan met us in person at the top of the cliff path and asked most solicitously for the Seiyid. We had no very good news to give him. About a week later the Seiyid died. After his death there was some quarrelling as to the side of the border on which he was to be buried. There was even a question of fighting for the honour of burying him, for neither side was willing to forego the blessing expected to come upon the land which should hold his tomb.

The day after our return to Museimir we packed our lorry and prepared to leave. The Sultan however, insisted that we should ride with him in his car and he did us the honour of accompanying us as far as Aqqan. There, just before the road dips into the Wadi Aqqan, he bade us farewell. Sultan Siroor was most helpful and cordial throughout our stay in the Haushabi country, and we take this opportunity to record our gratitude to him for his kindness.

1. Examination of the people

Of the 191 people examined during this part of the survey, 127 were seen in Museimir village and 64 in the villages up the Wadi Tiban above Museimir. These fall into the following groups in respect of age and sex:-

	Museimir		Villages	
	Males	Females	Males	Females
0 - 1 yr.	2	1	0	0
1 - 2 "	1	0	0	0
2 - 10 "	19	5	25	2
10 - 15 "	18	0	9	0
15 - 45 "	72	4	18	0
over 45 "	5	0	10	0
Total	117	10	62	2

Occupation

Museimir:- 92 males gave particulars of their occupations as follows:-

landworkers	30	herdsmen	20	soldiers	16
shopkeepers	7	houseservant	1	builders	5
teachers	2	dispenser	1	towncrier	1
woodgatherer	1	labourers	2	roadman	1

Villages:- 42 males gave particulars of their occupations as follows:-

landworkers	17	herdsmen	10	schoolboys	8
shopkeepers	4	teacher	1	soldier	1

Woodgatherer 1

Intelligence

Museimir - Good 78 males 4 females Villages - Good 31 males 1 female
Fair 11 " 2 " 15 " 0 "

Literacy

Museimir - 7 males, of whom 6 were in the 15 - 45 group, claimed to be able to read and write. The Sultan is himself illiterate.

Villages - 9 males, of whom 6 were in the under 15 groups, claimed to be able to read and write.

There were schools in the villages but none in the capital. In the villages 6/34 boys under 15 were literate.

Cleanliness

Museimir -	Head		Body		Clothes		Villages	Head		Body		Clothes	
	M.	F.	M.	F.	M.	F.		M.	F.	M.	F.	M.	F.
Good	40	1	36	1	30	1		25	0	23	1	13	0
Fair	69	8	71	9	72	8		33	1	32	1	41	2
Poor	7	1	9	0	13	1		4	1	7	1	7	0

In the villages 1 in the 2 - 10 group had no clothes and one was lousy.

General Physique

Museimir -	Male	Female	Villages -	Male	Female
Satisfactory	48	1		23	0
Less satisfactory	42	7		23	0
Poor	7	2		5	1

Rickets

Museimir - 3/46 children under 15 had rickets. Of those one, a child of 18 months, still on the breast, was a very bad case with large head, patent fontanelle, no teeth, pot belly, big spleen and bowed tibiae.

Villages - 4/47 children under 10 (4/36 under 15) had rickets.
1/28 adults showed a rickety rosary.

Teeth

Museimir -	Male	Female	Villages -	Male	Female
Good	53	5		33	1
Fair	14	1		14	0
Poor	17	2		12	0

Gums

Museimir -	Male	Female	Villages -	Male	Female
Good	24	3		21	1
Spongy	76	3		29	1
Gingivitis	10	0		7	0
Pyorrhoea	8	0		3	0

Other conditions suggesting defects in diet

Museimir - Night blindness, 5 cases, all in the 15 - 45 group.

Villages - Night blindness, 2 cases, 1 in the 15 - 45 group and 1 over 45.

(See also hyperkeratosis under Skin Conditions).

Eye conditions

Trachoma - Museimir. 45/124 showed evidences of trachoma in the following stages. Tr.I. 29, Tr.II. 2, Tr.III. 6, Tr.IV. 8. The percentage incidence, 36, was fairly regular in the different age groups, being a little higher, 42, under the age of 15.

Other Villages. 20/59 showed evidences of trachoma in the following stages Tr.I. 16, Tr.II. 2, Tr.III. 2. The general percentage was 34, being 47% under 15 and 16% over 15.

Other eye conditions. Museimir. Acute conjunctivitis, 3 (all under 15); tarsal cyst, 2, white deposits in sclera 1; adherent leucoma 1; senile ectropion 1; R. corneal opacity with left cataract 1; shrunken useless globe 1.

Other Villages. acute conjunctivitis 1; senile cataract 1; (cases of night blindness noted above).

Heart conditions

Museimir - systolic murmur 2 males, 15 - 45.
1 male, under 10.
marked arhythmia 1 male under 10.

No abnormal cardiac conditions were noted in the villages.

Lung conditions

Museimir - bronchitis, 4 children under 15.
asthma, 1 adult.

Villages - bronchitis, 1 under 10
1 male adult.

Skin conditions

Museimir - septic spots 9, hyperkeratosis 7, ulcer of leg 4, scabies 4, blue skin 2, bahaq 1, bashash 1, acne vulgaris 1, ringworm 1, favus capitis 1

Villages - septic spots 7, bahaq 4, hyperkeratosis 3, ulcer of leg 2, bashash 1, impetigo 1, large pigmented moles 1. cutaneous leprosy 1 (a qat seller).

Conditions of bones and joints

Museimir - bowing of tibiae (rickets q.v.) 1
asymmetry of lower jaw 1

Villages - fracture radius 1
prepatellar bursitis 1
lumbago and fibrositis 1.

Deformities

Museimir - umbilical hernia 1. dermoid cyst 1.

Villages - umbilical hernia 1. lipoma of abdominal wall 1.
double pes cavus with wasting of calf muscles 1 (old anterior poliomyelitis).

Evidences of malaria

Museimir - splenic enlargement was noted in 78 of 126 cases examined,
In the 2 - 10 group 22 of 24 had enlarged spleens.
Splenic index 92%.

In this group details of splenic enlargement were as follows:-

to 1 finger breadth below costal margin	4	average enlarged spleen = 2.5
2	8	
3	6	
4	3	
5 or more	1	

Villages - splenic enlargement was noted in 46/61 cases. In the 2 - 10 group 23/27 had enlarged spleens.
Splenic index 85%.

In this group details of enlarged spleen were as follows:-

to 1 finger breadth below costal margin	3	average enlarged spleen = 3.0
2	5	
3	8	
4	5	
5 or over	2	

No haemoglobin estimations were done and no blood slides examined.

Evidences of Bilharziasis. Three cases presented themselves with symptoms suggesting intestinal bilharziasis. In two of these cases a sample stool containing blood and mucus was obtained but no bilharzial eggs were found on microscopic examination.

Vaccinal state

Museimir -		Villages -	
vaccinated	17	vaccinated	7
had smallpox	28	had smallpox	3
unvaccinated	81	unvaccinated	53
40% protected.		16% protected.	

Vital statistics. At Museimir 4 women in the 15 - 45 age group were seen. Of these 1 was of slave blood, 1 was a Zabeedi and 2 were local Arabs. No adult women were seen in the villages up the wadi from Museimir.

Of 4 women between 15 and 45 all had been married, though one was a widow after 8 years of married life. Marriage rate 100%.

14 children had been born alive to these 4 women. Fertility rate and Married Fertility rate 3.5.

5/14 children born alive had died in infancy. Infant mortality rate 357/1000.

5/14 died under five years. Child mortality rate 357/1000.

Morbid conditions complained of - Museimir -

fever	38	other injuries	3	leg ulcers	4
cough	13	joint pains	7	dysentery	2
dyspepsia	9	infant diarrhoea	1	asthma	1
septic hand	1	varicose veins	1	whooping cough	1
acute rheumatism	1	bejel (from Zabeed)	1	otitis media	2
camel bite	2	trachoma	1	deafness	1

leaking wound after suprapublic cystotomy 1 (from Zabeed)

Villages - fever	14	joint pains	8	otitis media	1
cough	6	leg ulcer	2	leprosy	1

dysentery (clinically bilharzial) 1.

Comment. Examination of a sample of the people in a typical riverside district of the Haushabi country reveals the following four points:-

(i) The whole area is hyperendemic to malaria.

(ii) In spite of the R.A.F. report on the prevalence of bilharziasis along the Wadi Tiban we found very little evidence of it in this area. *

(iii) The occurrence of a leper at Dar Mukeidim should be remembered in any attempt to plot out the leper centres of the Protectorate and further investigations should be made here.

(iv) Again the number of females examined was disappointingly small.

2. Nutrition

Standard of Physique. Many of the children were pot-bellied and asthenic. The general standard was less than satisfactory.

The people are of mixed blood - of 191 seen 6 were recorded as of slave blood, 4 as Hijris, 7 as "mixed", and 3 were travellers on their way to Zabeed. The Hijris were specially noted as being of better physique.

Diet. The staple diet is Indian corn, but millet (Ghorb) is only slightly less popular. Both are eaten as bread or as porridge.

Consumption of meat - very little, on an average less than once a week.

fish - dried fish and sardines are always available. The larger fish are dried and salted, the sardines are only dried. Most people have fish once or twice a week.

milk - whole fresh milk and buttermilk are available. On an average an adult consumes 1 pint of buttermilk and 5 ounces of fresh milk daily.

salt - adequate.

vegetables - a vegetable caravan comes to Museimir once a week. The commonest vegetables available are onions, leeks, and radishes. Wealthier people also have tomatoes, eggplant, and ladies' fingers. Some leeks, radishes, onions and tomatoes are grown locally.

cowpea - (Dijr) Harvested in January and eaten in that month and in February. It is not very popular and is only used in soups. It could become a useful source of additional protein.

The soil:-

Fertile silt is brought down into the wadi by flood waters. This is resurfaced each year where the fields lie below the level of the year's flood water. Fields not so flooded require irrigation and manuring.

fruit - Papayas, peaches, guavas, and bananas are available in their season but only a few of the wealthier people buy them.

qat is much used.

Meals are taken three times a day, at 7 a.m., noon and at 8 or 9 p.m.

Other feeding customs. At seven months children are given bread; later, cows milk, fat and sugar are given but the child is not weaned until it is two years old.

No special diet is given to pregnant women but in Museimir there is a tradition that sardines increase the mother's milk.

Comment. Signs of vitamin deficiency were spongy gums, night blindness, phrynoderma and rickets. From these, and a study of the dietary the main lack would seem to be of vitamins A, C and D, and of first class protein. The diet could be improved by:-

(i) Encouraging the eating of fresh tomatoes and green vegetables.

* The R.A.F. report, of course, specifically excludes the local population.

(ii) Increasing the consumption of dijr. (cowpea)

(iii) Increasing the consumption of milk.

(iv) Increasing the consumption of meat and fish (at present these are too expensive for most of the people) or of eggs.

3. Water supply

Source. The Wadi Tiban is the only source.

Accessibility. All water has to be carried from the river to the village. This is done by women. They carry their water pots or petrol tins up and down the precipitous path between the village and the river.

Protection of source and existent contamination. No effort is made to protect the river from fouling. Clothes are washed and people bathe in it, animals and human beings foul it with their excreta and every village up stream adds its quota of contamination. The river contains many snails and leeches, a few small fish and some mosquito larvae.

Water used and available. About four gallons per head per day are used for drinking and cooking. Nearly all personal washing is done in the wadi but some water is kept in houses for ritual washing before prayers. The supply of water in the wadi was abundant and seems always to be so.

Sanitation

Disposal of dry and trade refuse. Rubbish heaps abound both in the village and on its perimeter. The largest are on the cliff side overlooking the river. All rubbish is deposited on the heaps. Recently, at the instigation of the dispenser, these heaps have been set on fire. The dispenser also advises people to keep their rubbish heaps farther from their doors than formerly. His efforts in these matters have not been confined to Museimir, but have extended to villages up the wadi.

Reception of excreta in houses. No provision is made for the reception of excreta in houses other than the Sultan's castle, which has a long-drop system. Both men and women use any suitable cover, especially along the cliff edge.

Final method of disposal. No provision is made for final disposal except where, for some special reason such as sickness, the courtyard of the house is used for defaecation. In such cases final disposal is made to the nearest rubbish heap. Micturition takes place in the courtyards and on the roofs of houses. On the roofs of many of the houses there are little runnels to lead the urine from the roof.

Public conveniences. Another of the dispenser's "improvements" to the village has been the erection of a stone uncemented wall which gives limited privacy to those using its shelter as a latrine. The wall is 3 ft. high and 6 yds. long. It has wings at either end facing away from the village. This is of course by no means the only place used, and is itself unsatisfactory.

Danger and Nuisance. Nuisance is very pronounced and the danger of dysentery and other intestinal disorders is obvious. The dispenser states that dysentery is common.

4. Housing

General. Museimir, on the left (east) bank of the Wadi Tiban, is situated some 120 ft. above the river. It lies at the edge of a plateau which, at the west side of the village, ends in a cliff dropping almost sheer to the river bank. There are several bends in the river near the village and in these fertile soil has silted up. This soil is tilled by the people. The population of the village is about 400.

Materials used in building. Most of the houses are of stone cemented with mud. Rough beams of undressed timber and brushwood plastered with mud are used for the roof. A few houses are of straw, and there were one or two matting tents.

The houses. Of the 124 houses reported on, 117 were of stone and 7 were of straw or matting. Of the 117 stone houses 87 had 1 room, 12 had 2, 2 had 3 and 1 had 4 rooms. The usual 1 roomed houses were separated from the path by a stockade. Inside the stockade there was a rough shelter used as a cook-house and for storing water. Often there was a second shelter for goats or a cow.

Occupants. The average number occupying a room was 3.0. The rooms were about 6 x 8 ft. and usually had a 6" square window in each wall.

Presence of livestock in houses. Livestock is usually kept in shelters in the stockade but chickens may be kept in the houses. In some of the houses of poorer people who own only one goat, and which have no stockade, the goat shares the house with its owners.

Comment. The greatest lack is the entire absence of sanitary arrangements.

5. Special investigations regarding malaria

General. The people in the area seen were taken as typical of the population of the upper north-west corner of the Haushabi country drained by the Wadi Tiban. Their economic status is just above subsistence level.

Most of them are landworkers but there is also a fair proportion of herdspeople. The villages are far enough advanced to have a few shops. The Sultan has a retinue of soldiers. Landworkers, herdsmen, soldiers and shopkeepers in that order make up the community.

The district has a considerable traffic with Yemen on one hand and Aden on the other. One of the main caravan routes between Aden and Yemen passes through Museimir, and the main motor road passes within five miles of the Haushabi capital.

Some Yemenis have settled in the district and some hijris. The Sultan has servants and soldiers of slave descent. There are thus definite evidences of mixed blood in the populace.

In general, the people are of unsatisfactory physique though not markedly undernourished. The children tend to be asthenic and pot-bellied. On the whole the pure hijris are of better physique than the others.

Mosquitoes. Breeding places were found in pools left by the flood waters of the wadi and in the backwaters of the permanent stream. It seems probable that recent floods had cleared out many other breeding places just about the time of our visit.

The anopheline mosquitoes found were

A. gambiae (both adults and larvae were found).

and A. dhali

A. gambiae predominates.

The favourite type of breeding place used by these anopheline mosquitoes was the weedy edge of a pool or stream.

In spite of the examination of house water pots and collections of water about the house courtyards, no domestic breeding places were found.

Comment. Museimir and district must be considered as one of the dangerous malarious regions of the protectorate. A British officer who stayed two nights in Museimir during the survey had an attack of malignant tertian malaria soon after his return to Aden.

There would not seem to be any very simple method of eradicating the breeding places of mosquitoes in this area.

Special investigations regarding bilharziasis

In 1935 members of the R.A.F. who bathed in the Wadi Tiban at Museimir subsequently went down with bilharziasis (mansoni). Squadron Leader (now Wing Commander) Haythornthwaite conducted certain investigations and reported that shells of Planorbis and Bulinus were found at Museimir "where the infection is unknown among the local inhabitants". ***

Our attempts to find bilharziasis among the local inhabitants were not very convincing and the report received on the shells we collected and sent for identification reveals no common vector of the infection. The specimens were identified by Major Connoly of the British Museum as follows:-

From Wadi Tiban near Museimir - Buryptyxis forskalii
Biomphalaria arabica
Melanoides tuberculata

From irrigation channels near Museimir - Zootocus insularis
Obeliscella lucidissima.

In commenting on this report Prof. Buxton says "none of your snails are well known carriers of bilharziasis. It means that if you want to go farther into the matter one would have to carry out a lot of experimental work on local snails; unless indeed you search farther and discover more sorts of snail".

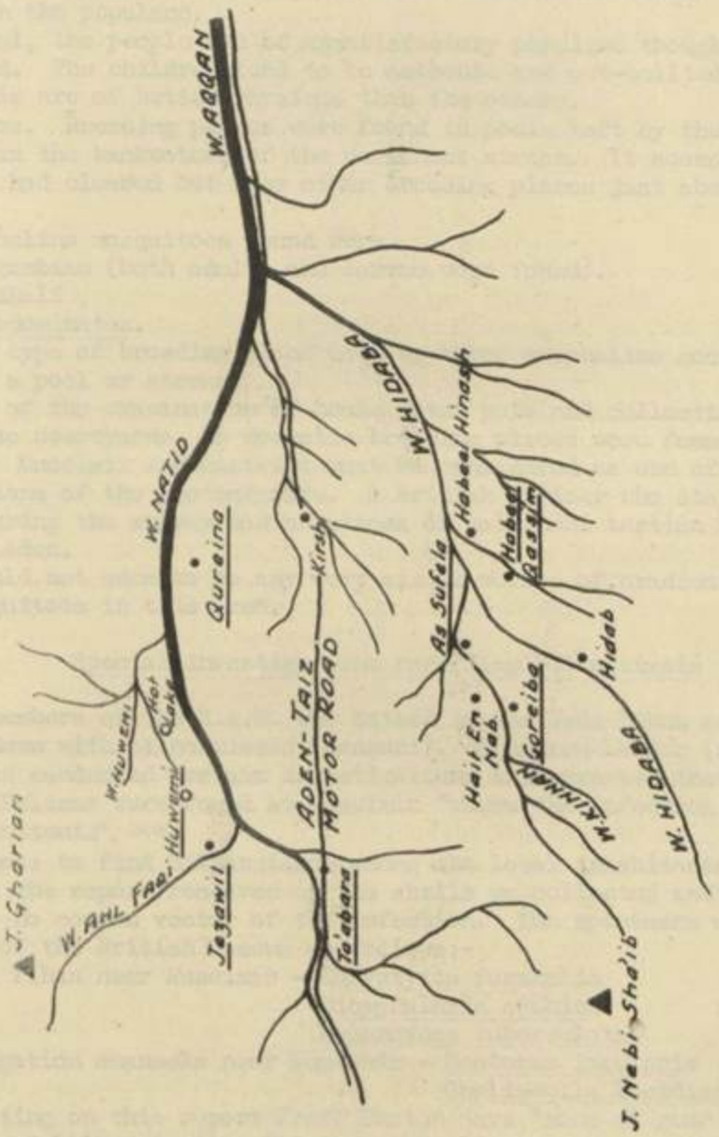
Comment. As to the occurrence of bilharziasis among the local population at Museimir the case must be left for the moment unproven. The problem offered by the snails will have to be referred to again in connection with other areas. We did come upon definite bilharzial areas but it still continued to be true that none of our snails were well known carriers of bilharziasis.

The journey to Kirsh

On March 14th, 1940, after we had made our farewells we left Sultan Siroor at the little village of Aqqan and descended into the Wadi of that name.

At this point the Wadis Aqqan, Warezan and Tiban all unite and there is a fair

*** The R.A.F. report, of course, specifically excludes the local inhabitants.



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body of water in the river - but spread over a broad surface so that it is easily fordable.

The ascent out of the wadi is very steep and rough. The rocky hillsides are well grown with euphorbia and we saw several spiral forms.

For some distance the road followed the general direction of the Wadi Aqqan, though high up above it, then, descending again, met the river bed where the Wadi Natid and the Wadi Hidaba join to form the Wadi Aqqan. After following the Wadi Natid for about a mile we struck off to the left up an unnamed wadi to reach Kirsh.

This road we had followed is the main road between Aden and Yemen - the Great North Road. The direct road to San'a, the capital of Yemen is only passable by motor to a point a little beyond Ta'iz but the old caravan road continues north into the mountains. A much less direct route by Ta'iz, Mokha and Hodeidah is now passable for motors.

(b) Kirsh

(See Map)

Kirsh we found to be little more than a coffee shop by the roadside. Up on the hill opposite the coffee shop there is a wireless post manned by a dozen Lahej soldiers, and a little distance away there is the house of the 'Aql of the district.

We found a camp site on the hill beside the wireless post and there we pitched our tents. After our camp was in order we walked down the hill and across the road to explore. Here we found several patches of damp grass. In these, holes had been dug, which filled up with water. The supply seemed to be plentiful. From time to time bubbles of gas gurgled up from the black soil on the floor of the pool - but the water itself, unlike that in similar pools seen later in Huweimi, was cold. In the pools were many frogs, and large water beetles and a few mosquito larvae.

In the evening we had a talk with the 'Aql. He told us that the villages within easy reach lay up our wadi towards Huweimi and across country to the west in the Wadi Hidaba. We decided to make a visit to Huweimi next day and see the Hidaba villages later.

The Survey. We had been told that Huweimi was on the motor road, so next morning we drove up the wadi and then across country till we rejoined the Wadi Natid. In the wadi we soon came to a village perched on a cliff by the wadi side. This we found was Ta'abara. Ta'abara is a small village of some twenty houses. These houses are small, dark, one roomed stone buildings. They are closely packed together, very roughly built and plastered with manure. The roofs are of rough tamarisk branches and brushwood plastered over with mud. Sheaves of red millet are stored on the roofs.

The village overlooks a bend in the wadi in which there are fields of red millet and indian corn. No provision is made in the houses for sanitary needs. The village was surrounded by large, high rubbish heaps. We got a stance at the door of one of the houses and saw some cases. In spite of their surroundings the people seemed to be fairly healthy.

After we had seen as many of the people of Ta'abara as were willing to be seen, we asked our way to Huweimi. We were directed back along the Wadi Natid and found Huweimi in that part of the wadi through which the main road does not pass. On the way to Huweimi we passed the well of Ta'abara, which lies in the wadi about a mile downstream from the village.

Huweimi, like Kirsh, we found to be a name on the map but not really a village. None the less it was very interesting. Its main interest was a large patch of green grass probably about five acres in extent into which hot streams percolated from different directions.

We traced one of these streams back to its source and guessed the temperature of the water to be about 140°F. - too hot to keep one's hand in. The air about the source had, we thought, a sulphurous smell, but the water was beautifully clear and we took a bottleful back to camp. After being boiled and cooled it was good drinking water and made good tea. The R.A.F. report however declared it to be unfit for human consumption (see appendix IV).

The streams from the various hot springs were led to a small lake where the water was allowed to cool before being used to irrigate the fields. On the grass by the lakeside were grazing the healthiest looking cows we had so far seen in South Arabia. In the water by the lake edge, and in the irrigation channels running from it, we found some snails and some mosquito larvae.

Growing by the lakeside was a large tamarind tree - we gathered some of its fruit from which our cook later made us a most refreshing drink. The place seemed deserted, but eventually we came on a man and three small boys. East of us across an expanse of cultivated land there was a ridge of hills and on top of the ridge

a few houses. We climbed up to them but no one was at home. From the ridge we looked down on the Wadi Ahl Faqi and we could see where it joined the Wadi Natid. From where we were both wadis seemed to be very fertile and quite populous. All the houses in sight seemed to be grass huts. When we came down from the ridge we asked the man at Huweimi where all the people from his wadi were. He said that the men were at trial in Kirsh where a case was being heard before the 'Aql and that the women had all run away because they had heard that the doctors were coming to steal their most beautiful girls. Back in Kirsh we did in fact manage to see a number of the men from Huweimi and brought our case total for the day up to thirty.

Next morning we set off to climb the ridge that lay between us and Wadi Hidaba; as it turned out there were two ridges. From the crest of the second we could see away below us the wadi and strung along it some five or six little villages. We decided that they were worth spending some time on and so gave the prearranged signal for the donkeys and camel awaiting at our camp for our decision. After we had seen our gear loaded on to them and knew that they had left camp we went down from the ridge into the wadi. As we came down into the wadi we found the well which supplies the villages of Habil Himash and Habil Qassim. The 'Aql's son came with the animals and introduced us to the villages. Soon the cows were dispossessed of their place in the lower floor of a small dar, and we settled there to see patients. After seeing fifteen people we rode up the wadi to Sufeila and Goreiba and warned the people to be ready for our next visit. We spent another two days in the villages of Wadi Hidaba and its tributary Wadi Kinhan, seeing 94 cases and getting the usual data about housing, water, sanitation etc. Then we turned our attention again to the villages in Wadi Natid. The 'Aql's son took us to Jezawil - a largish village in the Wadi Ahl Faqi. The village itself is hidden away in a cleft in the hills and would be quite difficult to find without a guide. Jezawil is separated from its well by a steep rocky ridge. We visited Huweimi once again and found that three of its inhabitants were lepers. We also visited Qureima, a small village which depends for its water supply on a very muddy and scanty little spring which trickles down the mountain side into Wadi Natid. Finally we explored the whole stretch of the Wadi Natid from Huweimi to where the wadi joins the Aqqan. In this area Carter found many tsetse flies, but though we beat the bushes on both sides of the Wadi and went in and out among the undergrowth for some distance beyond, we found none, and though we kept a sharp watch we found no Glossina pupae. We explored the bushes alongside the Wadi Hidaba and for some distance down the Wadi Aqqan with a like result.

In presenting the details of the survey it has been felt that it would be clumsy to keep each village separate, so they have been grouped into two areas, the villages of Wadi Natid and the villages of Wadi Hidaba. Thus Wadi Natid includes - Ta'abara, Jezawil, Huweimi and Qureima, while Wadi Hidaba includes Habil Qassim, Habil Hinash, Sufeila and Ghoreiba.

1. Examination of the people

Of the 161 persons seen from our base at Kirsh, 94 were seen in Wadi Hidaba and 67 in Wadi Natid. These fall into the following groups in respect of age and sex.

	Wadi Hidaba		Wadi Natid	
	Males	Females	Males	Females
0 - 1	0	1	0	0
1 - 2	3	1	0	0
2 - 10	19	7	8	4
10 - 15	12	0	9	0
15 - 45	41	3	33	4
over 45	5	2	7	2
Totals	80	14	57	10

Occupation. In Wadi Hidaba - 59 males gave details of their occupations as follows:-

herds 40 (21 camelmen, 18 shepherds, 1 cowherd), landworkers 17, woodcutter 1, merchant 1.

In Wadi Natid - 44 males gave details of their occupations as follows:-

herds 25 (12 camelmen, 10 shepherds, 2 cowherds, 1 donkeyman), landworkers 17, woodcutter 1, qat seller 1.

The donkey and camelmen are porters and are often away from home on long journeys into Yemen or down to Aden. The others very seldom leave the neighbourhood of their native village.

Intelligence. In Wadi Hidaba, of 60 people, 39 were returned as good, 20 fair, and 1 poor. In Wadi Natid, of 45 people, 37 were returned as good and 8 fair.

Literacy. In Wadi Hidaba 1 boy in the 10 - 15 group and 3 men in the 15 - 45 group were literate i.e. 4/58 males over 10 years. All females were illiterate.

In Wadi Natid 2 males in the 15 - 45 group were literate and of those 1 was a Lahej soldier; 49 males over 10 were seen and of these 5 were Lahej soldiers, so that of the people of Wadi Natid 1/44 of the males over ten was literate. All the females were illiterate.

Cleanliness.

	Wadi Hidaba							Wadi Natid						
	Head		Body		Clothes			Head		Body		Clothes		
	M.	F.	M.	F.	M.	F.		M.	F.	M.	F.	M.	F.	
Good	12	1	12	0	3	0	Good	13	0	13	0	6	0	Good
Fair	63	12	50	9	60	3	Fair	40	8	31	6	44	5	Fair
Poor	5	1	19	5	18	6	Poor	4	1	13	3	13	4	Poor

Physique

	Wadi Hidaba		Wadi Natid	
	M.	F.	M.	F.
Satisfactory	38	1	32	1
Less satisfactory	35	10	20	7
Poor	5	3	4	0

Occurrence of Rickets. In Wadi Hidaba 3 cases of rickets were seen in the under 10 groups; none was seen in the 10 - 15 age group; i.e. 3/31 under 10 and 3/43 under 15.

In Wadi Natid no case of rickets was seen in any of the age groups under 15; i.e. 0/12 under 10 and 0/21 under 15. Two adults were seen with rickety rosary.

Teeth

Wadi Hidaba -	Good 51	Wadi Natid - Good 39
	Fair 26	Fair 15
	Poor 13	Poor 8

Gums

Wadi Hidaba -	Good 36	Wadi Natid - Good 22
	Spongy 45	Spongy 32
	Pyorrhoea 2	Pyorrhoea 6
	Gingivitis 2	Gingivitis 0

Other signs of dietetic deficiency

Wadi Hidaba - 3 cases of angular stomatitis.
Wadi Natid - 5 cases of night blindness.

Eye conditions. Wadi Hidaba:-

trachoma - 9/84 all in stage I (less than 11%).
cataract - 2, both senile double cataract, also traumatic cataract 1
corneal opacity - 1 monocular, 1 binocular
pterygium - 1 (binocular)

Wadi Natid:-

trachoma - 9/58. 7 in stage I, 2 in stage IV (about 15%)
corneal opacity - 1 (traumatic)
loss of one eye - 1 (traumatic)
acute conjunctivitis - 1. also night blindness as above.

Heart conditions

Wadi Hidaba - 1 child under 10 had a mitral systolic murmur.
Wati Natid - No abnormal cardiac conditions were noted.

Lung conditions

Wadi Hidaba - 2 cases of bronchitis in the 15 - 45 age group, and 1 in the 2 - 10 group.
Wadi Natid - No abnormal conditions in the lungs were noted.

Skin conditions

Wadi Hidaba - bahaq 2, acne vulgaris 2, septic spots 2, ulcer 1.
Wadi Natid - septic spots 6, ulcer 2, warts 1.

Conditions of bones and joints

Wadi Hidaba - talipes equino varus 1.
Wadi Natid - no abnormal conditions seen.

Deformities

Wadi Hidaba - dermoid cyst 1, hare lip 1.
Wadi Natid - dermoid cyst 1.

Evidences of malaria

Wadi Hidaba - Splenic enlargement was noted in 46/84 persons of all ages; 10/24 in the 2 - 10 age group.
Splenic index 41.

Degree of splenic enlargement:-

1 finger breadth below costal margin	4 cases	average enlarged spleen 2.1
2 " " " " "	2 "	
3 " " " " "	3 "	
4 " " " " "	1 "	

Wadi Natid - Splenic enlargement was noted in 27/63 persons of all ages; 6/10 in the 2 - 10 age group.

Splenic index 60.

Degree of splenic enlargement:-

1 finger breadth below costal margin	2 cases	average enlarged spleen 2.3
2 " " " " "	1 "	
3 " " " " "	2 "	
4 " " " " "	1 "	

Evidences of bilharziasis. Wadi Hidaba - 2 cases of haematuria were seen, one in a boy in the 2 - 10 group and one in a boy in the 10 - 15 group. In the sample obtained from the younger boy eggs of bilharzia haematobia were found.

Wadi Natid - 1 man in the over 45 group complained of haematuria; no sample of his urine was examined.

Vital statistics. Wadi Hidaba -

Of 3 women in the 15 - 45 group all had been married but 2 were divorced.
Marriage rate 100%.
7 children had been born alive to three women.
Fertility rate and married fertility rate 2.3.
of 7 children born alive 1 had died in infancy.
Infant mortality rate 143/1000.
of 7 children born alive 2 had died under the age of 5 years.
Child mortality rate 286/1000.
(One woman the in over 45 group was seen. She had had 8 living children. Of these 2 died in infancy and 1 under 5 years. If her figures are included the above rates are modified as follows:-
F.R. & M.F.R. 3.75. I.M.R. 200/1000. C.M.R. 333/1000).

Wadi Natid -

Of 4 women in the 15 - 45 age group 3 were married.
Marriage rate 75%. (the unmarried woman was a leper).
16 children had been born to 4 women.
Fertility rate 4.0.
16 children had been born alive to 3 married women.
Married fertility rate 5.2.
of 16 children born alive 4 had died in infancy.
Infant mortality rate 250/1000.
(two women over 45 were seen; both were married and had had 6 children. Of these 2 had died in infancy. If these figures are included they modify the above rates as follows:-
M.R. 83% F.R. 3.7. M.F.R. 4.4. I.M.R. 273/1000).

Vaccinal state.	Wadi Hidaba M.	Wadi Hidaba F.	Wadi Natid M.	Wadi Natid F.
Vaccinated	20	22	4	0
Not vaccinated	43	9	29	7
Had smallpox	15	0	23	2

Morbid conditions complained of

Wadi Hidaba -	fever	43	colic	1
	cough (colds and bronchitis)	15	whooping cough	1
			hernia	1
	joint pains and backache	4	asthma	1
	haematuria (bilharzia)	2	camel bite	1
	dyspepsia	1	deafness	1
Wadi Natid -	fever	27	leprosy	3
	cough	12	epilepsy	2
	joint pains	3	haematuria	1
	dyspepsia	3	diabetes insipidus	1

Comment. The Hibada and Natid districts are taken as typical of the drier wadi areas of the Haushabi country. It will be noted that the herdsmen outnumber the others by two to one. Other points of note are:-

(i) Malaria is endemic in both areas.
(ii) Trachoma is less common than in most other areas.
(iii) A nidus of leprosy was found at Huweimi, all three lepers were related to one another. Another was seen passing through Kirsh but he was not a native of the district.
(iv) bilharzia occurs.

2. Nutrition

Standard of physique - less than satisfactory.

Diet - The staple food is Ghorba (brown millet) but Indian corn is fairly popular. These are available all the year round and are used as bread and porridge.

Consumption of meat - occasional, probably not more than once a week.
fish - rare.
milk - varies with the occupation. Shepherds seem to get enough.
eggs - only a few are eaten locally, most are sold.
salt - ample.
vegetables - leeks, radishes and red carrots are fairly common. Sweet potatoes and onions occasional. Dijr (cowpea) is available for three months in the year.
fruit - occasional, bananas and papayas when in season. In times of famine the leaf of the vine called "alfag" is boiled and eaten with pepper and salt.

Meals are taken two, or sometimes three, times a day, at between 7 and 8 a.m. and at 6 p.m. - the third meal, if taken, is at noon.

Specimen diets of 6 males, all shepherds, were more investigated.

1. a.m. millet bread and milk. p.m. dry millet bread.
2. a.m. 1 pint of milk. p.m. bread sops, roasted Indian corn and some leeks.
3. a.m. ½ loaf millet bread dipped in milk.
   p.m. as a.m. with 1 radish and some leeks.
4. a.m. 1 loaf of millet bread with buttermilk.
   p.m. 5 heads of Indian corn roasted.
5. a.m. roasted Indian corn and ½ pint milk.
   p.m. as a.m.
6. This man was the only one of the six who had three meals a day.
   a.m. millet bread and milk. Noon, dry millet bread.
   p.m. dry millet bread.

All were boys about 12, except number 5 - who was an adult.

The diet would seem to be gravely lacking in proteins as well as in vitamins A, C and D.

81/160 - just over half - of the people had spongy gums and the occurrence of 5 cases of night blindness is noteworthy. Rickets and angular stomatitis were also seen but obvious signs of deficiency were met with less frequently than the poverty of the diet might lead one to expect.

The people are extremely poor but education in the value of milk and eggs in their diet might improve their condition.

3. Water supply

Source. Wadi Hidaba - Four wells in the wadi supply the villages. The following data were gathered concerning two of these wells.

(i) Sufeila:- Stone-lined but unplastered. Well head 2 ft. across. Bore 20 ft. deep to water level. Water 2 ft. deep. The well head fouled by animals and puddled. The animals drink from a wooden trough which is also used for washing clothes. The well head is flush with the level of the wadi bed but is protected against floodwater by a barricade of stones.

(ii) Ghoreiba:- Stone-lined but unplastered. Wellhead 2 ft. square. Bore 28 ft. deep to water level. Water 7 ft. deep. The wellhead is puddled and there is some fouling by animals. The wellhead is protected by a wall from flood water.

Wadi Natid - Jezawil and Ta'abara by wells, Huweimi, Kirsh and Qoreima by water holes. The following gives greater detail.

(i) Jezawil:- Well in a side wadi off Natid. Stonelined but unplastered. Wellhead 18 inches in diameter. Bore 16 ft. deep. The well is a mile from the village, over very rough country.

(ii) Ta'abara:- The well is in the Wadi Natid and is situated half a mile from the village. Description much as Jezawil.

(iii) Huweimi:- At least three hot springs feed a small lake giving an abundant supply of water. The water emerges at about 140°F.

(iv) Kirsh:- Shallow water holes are dug in the grass and these rapidly fill with clear cold water. Fresh water holes have to be dug from time to time but the supply seems to be adequate.

(v) Qoreima:- The spring here is very small - little more than a "weeping" rock side. A little hollow is scooped out with the hand in the damp soil by the rock and one waits till this fills up. The water supply here is very limited and the source is rather more than half a mile, over rough country, from the village.

Accessibility of source

Wadi Hidaba - The seven or eight villages supplied by the four wells lie from a quarter to a half mile from their nearest well.

Wadi Natid - The water holes of Huweimi and Kirsh are readily accessible to their users. Jezawil is a full mile from its well over stiff rocky country. Ta'abara is half a mile from its well but the path is easy. The spring supplying Qoreina is over half a mile from the village over a rough rocky path.

The water in both wadis is drawn and carried by the women. In Wadi Hidaba earthenware water pots or old petrol cans are most in favour whereas in Wadi Natid goat skins seemed to be more used.

Protection of source. The heat of the springs at Huweimi may give some initial protection, but otherwise there is no protection to the water supply of Huweimi, Kirsh or Qoreina.

The wells of both wadis are lined with stone and the well mouths are small. In some cases, as noted, there are barricades of stones to protect the wells from inundation by flood water.

Existent contamination

(i) Huweimi, Kirsh and Qoreina - The pools and springs are quite open and are fouled in places by human and animal excreta. In other places they are fouled by washing of clothes and by bathing. They are open to dust blown in the wind and there is a dense black deposit in the floor of these pools.

(ii) The wells - Here there is less contamination but the wellheads are puddled and insufficiently raised.

Danger of future contamination

(i) The pools and springs may at almost any time come to convey any water-borne disease.

(ii) The main danger would seem to be from seepage through the unplastered well shafts.

Water available. There is definite limitation at Qoreina. Elsewhere the supply is plentiful but in some cases the distance of the well from the village limits the amount used.

4. Sanitation

Method of disposal of domestic and trade rubbish

Wadi Hidaba - Refuse is dumped on communal rubbish heaps. These are burned regularly. In one case we saw the burning rubbish being used in the making of charcoal. The rubbish heaps are of two kinds:-

(i) mainly of goat dung,

(ii) more general but mainly of soiled straw.

Wadi Natid - Refuse is dumped on communal rubbish heaps but there was no evidence of these ever being burned. The same two kinds of rubbish heap were seen as in Wadi Hidaba.

Provision for the reception of excreta in houses

Wadi Hidaba - In two storeyed houses there was occasionally an alcove jutting out from the wall in the upper storey. This was used principally for urine but sometimes also for faeces. In the smaller houses no provision was made at all.

Wadi Natid - No provision is made at all.

Final method of disposal of excreta. None. Left to natural disintegration.

Comment. Nuisance is slight but there is some danger of the spread of dysentery and helminth infection.

The burning of the refuse dumps must be regarded as an advance on the unrestricted accumulation of excreta and rubbish.

Perhaps the people could be persuaded to use more of the accumulated goat dung and even human excreta as an economical asset - in manuring their fields and in other ways. (In Yemen dung cakes are used as fuel).

5. Housing

In the areas of Wadi Hidaba and Wadi Natid visited there are some ten villages with an estimated total population of 800. The houses in the two wadis are very much alike and the wadis are therefore not described separately.

Materials used

(i) Stone. These houses are of dry stone, plastered inside with a mixture of mud and manure. Tamarisk branches form the roof and these too are plastered over. The windows are unglazed and very small.

(ii) Brushwood. The better huts are of tamarisk branches plastered inside with mud and dung. The poorer ones are of straw.

There were 97 stone and 25 brushwood houses.

Size of the houses. Stone houses - These are of two kinds. In the language of the country they are "daimas" and "dars".

A daima is a single-roomed stone house usually about 8 x 12 x 6 ft. high.

A dar is a two or more storeyed house. Usually it is merely a two roomed house, one room being built over the other.

Huts - Sometimes four sided but more usually circular in shape 12 ft. across, 6 ft. high in the centre.

There are many more daimas than dars - of 97 stone houses 77 were single roomed daimas, 15 two-roomed dars, 4 three-roomed dars and 1 four-roomed dar.

Occupants per room. 94 people lived in 20 dars which totalled 46 rooms, i.e. 2 per room. 100 people lived in 25 huts and 293 lived in 77 daimas i.e. 4 per room.

Ventilation. In all the houses the windows are extremely small and the doors are the main source of ventilation. The doors in the huts are also very small but some air comes through the interstices of the straw.

Livestock. In the dars the goats etc. occupy the lower storey. In the daimas and the huts there is usually an outhouse or enclosure for the cattle.

6. Special notes on malaria

General. The district is inhabited by a very poor pastoral people whose principal sources of livelihood are herding (camels, goats, cows and a few sheep) porterage (camels and donkeys) and agriculture. In spite of their poverty and the limited variety of their foodstuffs the general standard of nutrition is not so poor as might be expected.

Communication with outside areas. Immigrants are very few. The main caravan and motor road between Aden and Ta'iz passes through Kirsh and the porters are employed with their camels and donkeys up and down that road. The villages themselves are off the main road and the people, other than the porters do not wander far from their own districts.

Use of Quinine. Nil.

Mosquitoes. Permanent breeding places were found in Wadi Natid at Huweimi in weedy pools near the hot springs, at Kirsh in the spring water pools and at Qoreina in the stagnant pools of the Qoreina spring. Temporary breeding places were found in pools at the side of Wadi Aqqan.

No breeding places were found in Wadi Hidaba. Anopheline and culicine adults were caught and they along with larvae found in the breeding places were sent to the London School of Hygiene and Tropical Medicine and were identified as follows:-

Wadi Hidaba. A. gambiae adults only.

Wadi Natid (Hot springs, pools at Kirsh and puddles at Qoreina). A. gambiae, A. dhali, A. maerychoni, and A. rupicolus.

Mosquito control. It should be possible to treat the permanent breeding places regularly with oil or Paris green. The control of the river pools would be more difficult.

7. Special notes on bilharziasis

Snails were found in those parts of the Wadi Aqqan where there is a perennial stream, in the stagnant pool near the Qoreina spring and in the channels and pools draining the hot springs of Huweimi - these pools were weedy and at a temperature of about 100°F.

The snails were identified as

from Wadis Natid and Aqqan	-	Obeliscella lucidissima
	and	Zootecus insularis
from Qoreina		melanoides tuberculata
from Huweimi		melanoides tuberculata
		zootecus insularis and
		zebintrops ventricolose.

Of 161 people examined 3 complained of haematuria and in the urine of one of these the eggs of Bilharzia haematobia were found.

(c) El Milah

At the end of the Amiri survey we had planned to visit Thumeir but when we arrived there we found this impracticable because of tribal disturbances (see Amiri Survey) so we took the opportunity to move back into Haushabi territory and visit one of the Haushabi districts away from the Wadi Tiban system. The village we visited was El Milah on the Wadi Milah. For the greater part of the year the

Wadi Milah is dry but the flood waters descend sufficiently regularly to make it worth while keeping fields under cultivation. The people are partly agricultural and partly pastoral.

The village is quite a small one - a group of some 30 huts. The main trade route from Aden to Dhala' and the north passes through the village, which boasts a coffee shop and a small guest room at which one may put up for the night.

During our visit the road was being cleared and made more suitable for motor traffic and at El Milah there was a camp of some 300 road workers. With them was a guard of Lahej soldiers.

The population of El Milah is probably about 150. Of these we saw 50 as well as 26 road workers from the camp and 10 of the Lahej soldiers.

1. Examination of the people

Of the 50 people seen from El Milah 38 were males and 12 females in the following groups:-

Age	Male	Female	
0 - 1	1	1	
2 - 10	14	4	The soldiers and labourers
10 - 15	1	0	seen were all males in the
15 - 45	19	2	15 - 45 group.
over 45	3	5	

Occupation. 22 males gave particulars of their occupations as follows -

landworkers	7	charcoal burners	3
shepherds	4	soldiers to the Sheikh	2
camelmen	1	roadworkers	1
shop assistants	3	beggars	1

These were all residents in El Milah in addition, as already mentioned 26 road labourers and 10 soldiers of the Sultan were seen.

Intelligence. El Milah

		Labourers	Soldiers
El Milah	Good 25	Good 25	good 8
	Fair 6	0	0
	Poor 1	0	0

Literacy. El Milah 1 male in the over 45 group. Labourers 3. Soldiers none.

Cleanliness. El Milah

	Head		Body		Clothes		Labourers Head	Body	Clothes	Soldiers Head	Body	Clothes
	M.	F.	M.	F.	M.	F.						
Good	5	0	5	0	4	0	1	1	0	6	7	7
Fair	27	7	29	4	22	4	23	23	24	4	3	3
Poor	4	2	3	6	6	1	2	2	2	0	0	0

Physique. El Milah

	M.	F.	Labourers	Soldiers
Satisfactory	13	2	13	5
Less satisfactory	17	2	11	5
Poor	3	0	1	0

Rickets. Of 20 children seen in the under 10 groups 3 had rickets - these were all aged 2 - 10.

Teeth. El Milah

	M.	F.	Labourers	Soldiers
Good	9	3	7	2
Fair	21	3	17	5
Poor	8	2	2	2
Edentulous	0	1	0	0

Gums. El Milah

	M.	F.	Labourers	Soldiers
Good	7	4	4	3
Spongy	23	5	15	6
Gingivitis	1	0	6	0
Pyorrhoea	4	0	5	0

Other conditions suggesting deficiencies in Diet. El Milah
Angular Stomatitis 1 (a child in the 2 - 10 group)
Labourers. Night blindness 1.
Soldiers. Angular stomatitis 1.

Eye conditions. Trachoma, El Milah 5/36 all in Stage I; 3 in the 2 - 10 and 2 in the 15 - 45 group.
Labourers - 4/25. 2 Stage I; 1 Stage II; 1 Stage IV.
Soldiers - 5/10. 4 Stage I; 1 Stage III.

Other eye conditions. El Milah - acute conjunctivitis 1, double cataract 1, chalk grains in sclera 1, one eye lost 1.
Soldiers - acute conjunctivitis 1, dacrocystitis 1.
Labourers - Nil.

Heart conditions
El Milah - No abnormal cardiac conditions noted.
Labourers - Mitral systolic murmur 1.
Soldiers - No abnormal cardiac conditions noted.

Lung conditions
El Milah - bronchitis 3 (all in children under 10).
asthma 1.
Labourers and Soldiers - No abnormal conditions of lungs noted.

Skin conditions
El Milah - acne vulgaris 2, bahaq 1, dry condition of skin of face 1, papulo-vesicular rash face 1, ulcer leg 1, impetigo 1, bashash 1.
Labourers - bahaq 6, scabies 1, ulcer of foot,1, acne vulgaris 1, very dry skin 1, scaly condition of skin of face 1.
Soldiers - Nil.

Conditions of bones and joints. Nil.
Deformities. Nil.
Malaria. El Milah - of 45 people seen 28 had enlarged spleens; of 18 in the 2 - 10 group 14 had enlarged spleens.
Splenic index 77⅞

Details of splenic enlargement in the 2 - 10 group were as follows:-

to 1	fingers	breadth	below	the	costal	margin	2	average enlarged spleen 3.3.
2	"	"	"	"	"	"	1	
3	"	"	"	"	"	"	3	
4	"	"	"	"	"	"	7	
5	"	"	"	"	"	"	1	

Labourers - 6/26 enlarged spleens (1 x 1 finger, 2 x 2, 2 x 3, and 1 x 5)
Adult spleen rate 23⅛. Adult enlarged spleen 2.6.
Soldiers - 3/10 enlarged spleen (1 x 2f. 1 x 3f. 1 x 4f.).
Adult spleen rate 33⅓. Adult enlarged spleen 3.0.

Bilharziasis. No evidences of bilharziasis were found in this district.

Vaccinal state. El Milah

	M.	F.	Soldiers	Labourers
Vaccinated	7	0	7	4
Had smallpox	5	2	1	19
Not vaccinated	24	9	2	3
i.e. protected	14/47		8/10	23/26

Vital statistics. 2 women in the 15- 45 group were seen at El Milah - both had been married - one still was, the other was divorced.
4 children had been born alive to these two women
Fertility rate and Married fertility rate, 2.0.
Of these 4 children born alive 1 had died in infancy.
(5 women in the over 45 group were seen - all had been married; 3 were widows. To these 5 women 26 children had been born alive; of these 26 children 7 had died in infancy and 2 others under the age of 5. Using these figures along with the 15 - 45 figures we got:-
Marriage rate 100%. F.R. & M.F.R. 4.28. I.M.R. 8/30 = 266/1000 and child mortality rate 9/30 = 300/1000).

Morbid conditions complained of. El Milah -

cough	13	otitis media	2
fever	22	whooping cough	1
bronchitis	3	epilepsy	1
dyspepsia	2	joint pains	1
asthma	1	ascaris infection	1

Soldiers - Fever,6, cough 2, joint pains 1, acute conjunctivitis 1, dacrocystitis 1.
Labourers - fever,8, leg ulcers 5, joint pains 3, cough 4, scabies 1, pharyngitis 1, hydatid (?) of Spleen 1.

2. Nutrition (El Milah only)

The general standard of nutrition was fairly good - 16/38 were returned as good and only 3/38 as poor.

Labourers' camp:- About 180 people were living in this camp. Of these 120 were working and the others hoping for work.

Housing - We visited 7 bell tents which housed 2, 11, 11, 11, 20, 30, and 50 respectively. This overcrowding was perhaps more apparent than real for while every man owned a box of some kind for his belongings and kept it in his tent the man nearly all slept out in the open air.

Sanitation - There were no sanitary arrangements in connection with the camp. The absence of marked nuisance is attributable to the sun.

Water - Drums of fresh water were provided daily.

Nutrition - There was a Government issue of 1 lb. of white flour per employed man per day. Otherwise each man made his own arrangements and they were poor enough. The unsatisfactory conditions are underlined by the occurrence of night blindness, ulcers of the leg and spongy gums.

Comment - The opportunity may be taken again to point out here that all such camps under the aegis of Government give an opportunity to present the local people with an example of healthy living conditions. This could be done especially by the provision of adequate sanitary arrangements.

The soldiers of the Sultan of Lahej were supplied with rice and white flour daily plus an issue of salt fish - they were given meat once a week.

Diet. Principal foodstuff - dukhn and ghorba (i.e. bulrush millet and the brown variety of giant millet). Indian corn is also commonly used. Rice and white flour are available and are used by a few people.

Meat - Nearly everyone has meat once a week; a few have meat daily.

Fish - Not very commonly used.

Milk - Most people have some but the quantity used is very small.

Salt - Adequate.

Fresh vegetables - Usually taken about once a week; leek, bedingal and bamia are the commonest vegetables.

Comment. El Milah is situated on one of the main motor roads from Aden and all the goods found in the Aden markets are theoretically available. In spite of this spongy gums are common and there is some rickets. The diet would seem to be inadequate in vitamins A, C and D and there is a shortage of first class protein.

3. Water supply

Source. A well in the middle of Wadi El Milah. The well is fairly accessible about 200 yds. distant. It is 50 ft. deep. The water is hand-drawn by the women. There were about 4 ft. of water in the well at the time of our visit.

Protection of the well. The lining is of stone and the well mouth is raised above the bed of the wadi.

Contamination. There is considerable puddling about the well-head and probably some seepage into the well through cracks in the well wall. When the wadi is in flood there is danger of inundation. There is no protection of the well mouth from sand storms etc.

Supply. The amount of water available seems to be adequate to present demands.

4. Sanitation

Methods of disposal of domestic dry refuse etc. Rubbish dumps in and around the village. There was no evidence of the burning of these dumps or otherwise lessening their bulk.

Disposal of Excreta etc. No provision is made in houses. Excreta is deposited in any convenient place out of doors and no steps are taken to see to its further disposal.

Comment. In spite of the lack of any sanitary provision there is very little nuisance. The strong sun both by its light and its heat must be given credit for this. There must however be some danger and this will be increased in wet weather - which is infrequent.

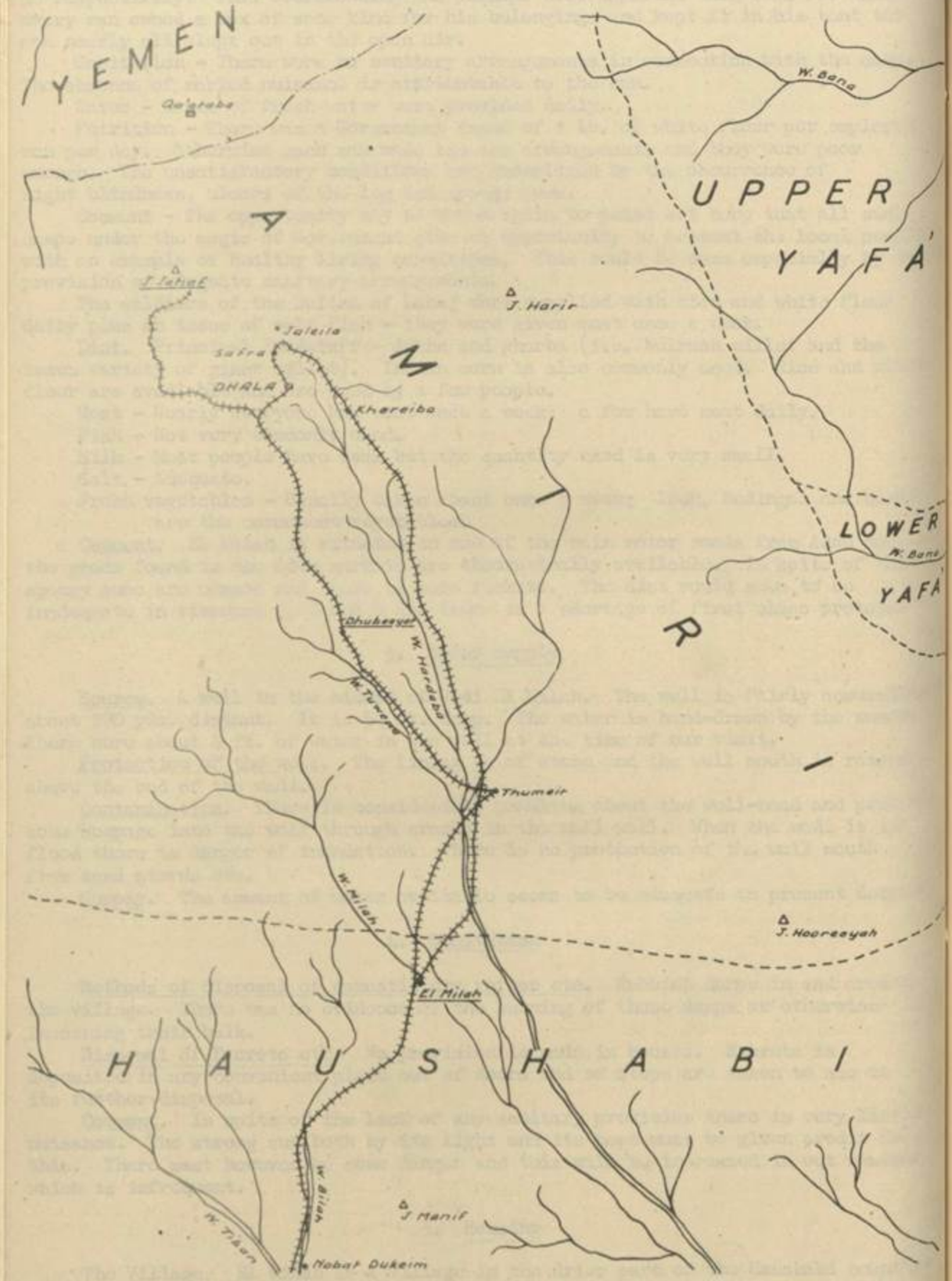
5. Housing

The Village. El Milah is a village in the drier part of the Haushabi country. It is situated on the left (east) bank of the Wadi Milah. The Wadi Milah is dry nearly all the year round, but its annual flood is sufficient to provide irrigation for a few fields south of the village.

The houses. Some 30 to 35 houses shelter the population, which we estimated at between 120 and 150.

The materials used in building are brushwood (mainly Tamarisk) and mudbrick.

Brushwood houses. All the brushwood houses are one-roomed. 47 people were reported as living in 13 brushwood houses; average per room 3.6.



Mudbrick houses. Only 4 of the mudbrick houses were one-roomed, 21 people were reported as living in these 4 houses; average 5.25 per room.

8 of the mudbrick houses were two-roomed and housed 47 people; average 3.0 per room.

Three 3-roomed mudbrick houses and two 4-roomed mudbrick houses housed 32 people; an average of 2.5 and 1.1 per room respectively.

The over-all average was 3.0.

Comment. As the visit to El Milah was very short the investigations were incomplete and no notes were made of the presence of livestock in the houses.

6. Special investigation relating to Malaria

No larvae were found in and around the well but the domestic water pots were not examined and a further visit is needed to complete this section.

7. Special investigation relating to Bilharziasis

There were no evidences of bilharzia in this district.

Charcoal burning

The following notes on charcoal burning at El Milah may be of interest.

The wood mostly used here in the preparation of charcoal is "Sumr". (Acacia spirocarpa Hochst).

A large pit about 12 ft. across and 6 ft. deep is dug. Into the floor of this a layer of brushwood is thrown. The logs of Sumr are laid on top of the dry brushwood. A second layer of dry brushwood is laid on top and this is set alight. When the fire is going well the pit is covered with sand and left for four days. On the fifth day the charcoal is ready to be dug out.

On April 5th we set out on what proved to be the last of our journeys on the survey for the time being. The day before we left the rest of our equipment for the survey arrived in Aden and we unpacked it and took some of the things with us.

Our plans were to spend some time on the high plateau of Jebel Jahaf and then to come down to the wadi bed of Hardaba and stay at Thumeir. As the sequel will tell the latter part of this plan had to be abandoned but instead we spent some time at Dhubiyat at about 5000 ft.

THE AMIRI TRIBAL DISTRICT (See Map)

Geographically the Amiri area is roughly quadrilateral. It is bounded on the south by the Haushabi country, on the west and north by the Yemen and on the east and north by the Upper and Lower Yafa'i areas.

Amiri country is one of the most mountainous districts in the Protectorate and may be divided roughly into areas of high plateaux between 6,000 and 8,000 ft. above the sea; middle heights of between 4,000 and 6,000 ft., and the wadi beds at 2,500 to 4,000 ft.

Jebel Jahaf and Jebel Harir are typical of the high plateaux; Dhala' and Dhubiyat in the middle heights, while the Dakkam in Wadi Tiban and Thumeir in Wadi Hardaba represent the wadi beds.

Much of the country in the upper and middle heights is rocky but the soil is fertile and water is plentiful from innumerable wells as well as from a good rainfall. The mountain sides are terraced in many places and the terraces filled with good soil so that right to the mountain tops one finds cultivation. The wadi beds are dry and barren in summer but after the flood waters of autumn, cultivation is possible and the crops are good.

Agriculture is therefore the main occupation of the Amiris, so that settled communities are found and the whole area is scattered with villages. Some of the people, however, follow a pastoral life and there are many flocks of goats and sheep, and a few of cows.

The Amiri area includes many subtribes who, though they owe a certain amount of allegiance to the Amir of Dhala', are largely independent and often in a state of unrest from one cause or another.

Dhala' is the capital of the Amiri country and there the Amir Nasr has his castle. The Amir Nasr was absent from his home during our visit but we were very cordially received and given every facility for the survey by his son the Amir Hydara.

The journey to Jebel Jehaf (See Map)

The first part of our journey was over the same ground as we had traversed on our way to Mauseimir. At Nobat Dukeim we branched off to the right up the Wadi Bilah, then across to Wadi Milah and on to Wadi Hardaba.

The authorities were busy improving the road at the time to make it more suitable for motor traffic and the going was fairly good - even the pass of El Khoreiba, formerly very difficult, was taken without trouble.

We left Sheikh Othman at 10 a.m. and arrived at Dhala' about 5 p.m. We had not been long in the Dhala' guest house before we were visited by the Amir Hydera himself. On behalf of his father he made us welcome. He promised to have animals ready for us to proceed on our journey to Jehaf in the morning - the motor road stops at Dhala' and the ascent of the mountain has to be made on foot or on beasts.

At six next morning, true to his promise, there were three camels, three donkeys, one mule and two horses ready for us. Our equipment, however, needed seven camels, for on the journey up the mountain the camels cannot be very heavily loaded. Two more camels were soon found and we sent them on ahead as soon as they were loaded. It was 10 o'clock before the next two were ready but then we all set off.

The climb from Dhala' at some 5000 ft. to Lakama at about 8000 ft. was very interesting. There were villages all the way up and within quite short distances of one another. Nearly every village was built on the sides of a rocky eminence overlooking its own terraced or flat plateau. One village - El Qordhi - was populated largely by Jews. On our way we passed a number of rather dirty water holes swarming with culicine mosquito larvae, but when we actually arrived at the great plateau on the top of the mountain there were many wells, and these stagnant water holes were unnecessary.

We arrived at Lakama about 1.30 p.m. and were again welcomed by Amir Hydera for he has a palace of his own there and had gone on early in the morning to be there to welcome us.

The spot he gave us for our camp site was on the western edge of the plateau and from our tent door the ground dropped away steeply to the Dakkam some 4000 ft. below. There we could see the head waters of the Wadi Tiban crossing the plain, while away beyond, the horizon was bounded by the mountains of Yemen about Ibb.

Jebel Jehaf

The survey. Six complete days were devoted to the survey on Jebel Jehaf. The first three were spent, one each, in three of the many villages on the plateau - namely, Lakama, Hydera's capital, Es.Sirir, near the eastern end of the plateau and El Qordhi to the south of Es.Sirir. The fourth day was given over to entomology, on the fifth a second visit was paid to El Qordhi and on our last day on Jebel Jehaf we climbed the highest point of the mountain and drew a plan of the district.

At Lakama we saw about 60 people, but of these only 3 were females. One of the early patients was suffering from haematuria and an examination of his urine revealed an infection with Bilharzia mansoni. During the same day we saw three other cases of bilharziasis but microscopic examination of the urine revealed in these cases the more usual haematobia infection.

At Es.Sirir we saw some forty cases. The percentage of females seen was rather higher than at Lakama. One patient was an old man blind with cataract. He begged for an operation. Next morning before starting the work at El Qordhi he was operated on by the old operation of couching.**

Of the 42 people seen in our first day at El Qordhi two suffered from bilharziasis.

Thursday was market day in Dhala' and early in the morning nearly all the able-bodied people on the mountain left to sell their produce and buy what they needed at the market. We had therefore set this day aside for entomology etc.

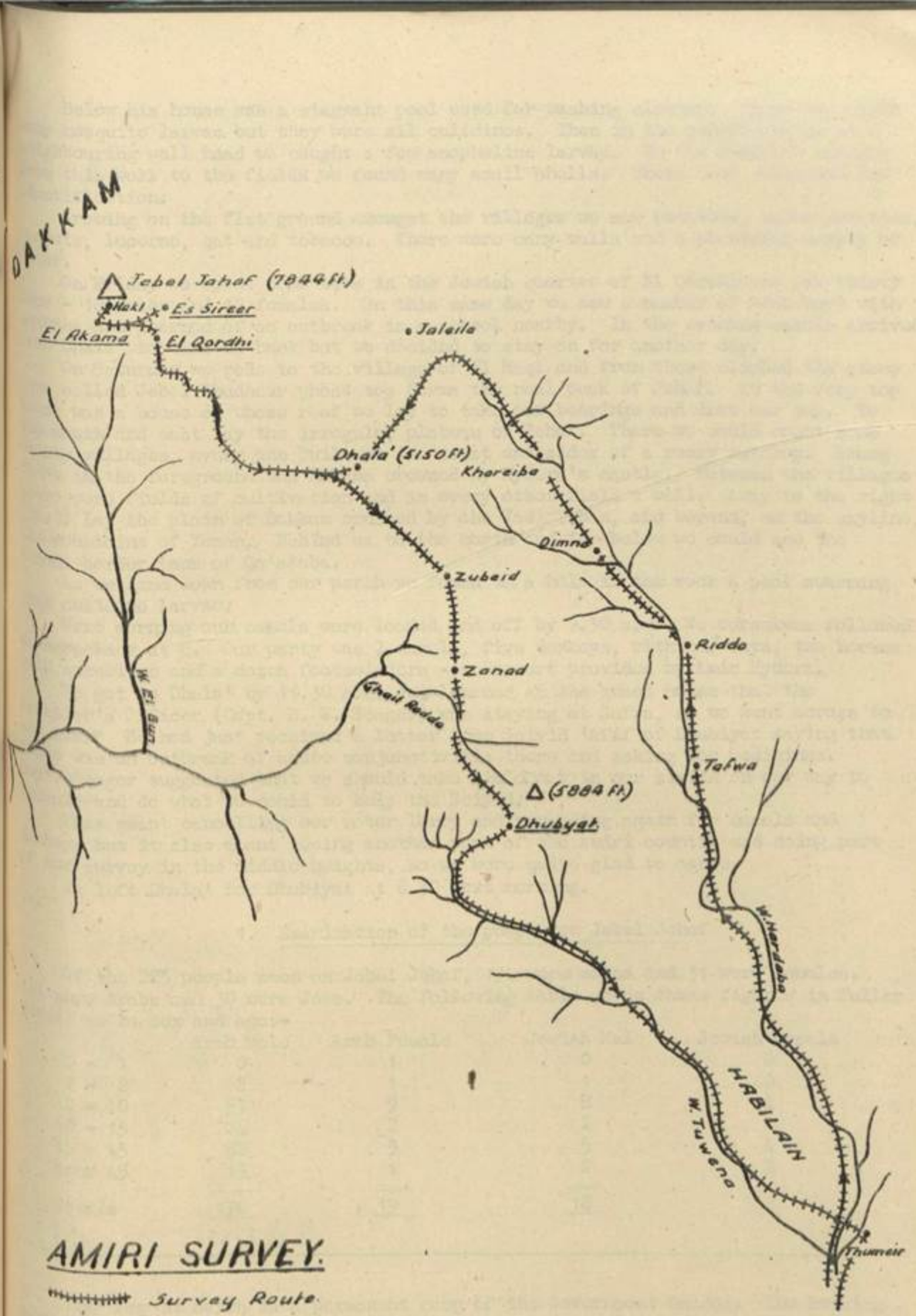
We began the day with a visit to the cataract patient.

** The indications for this operation, which consists in a simple posterior dislocation of the lens, are seldom met with but in this case the operation seemed justified for the following reasons:-

(i) Open operation would have been very risky in the conditions prevailing and we were not to be long enough in the district to nurse the patient.

(ii) He would not go to Aden for treatment and indeed could not have done so.

(iii) This seemed the only chance of giving him some vision and was justified by results.



AMIRI SURVEY.

Survey Route

Places surveyed are underlined

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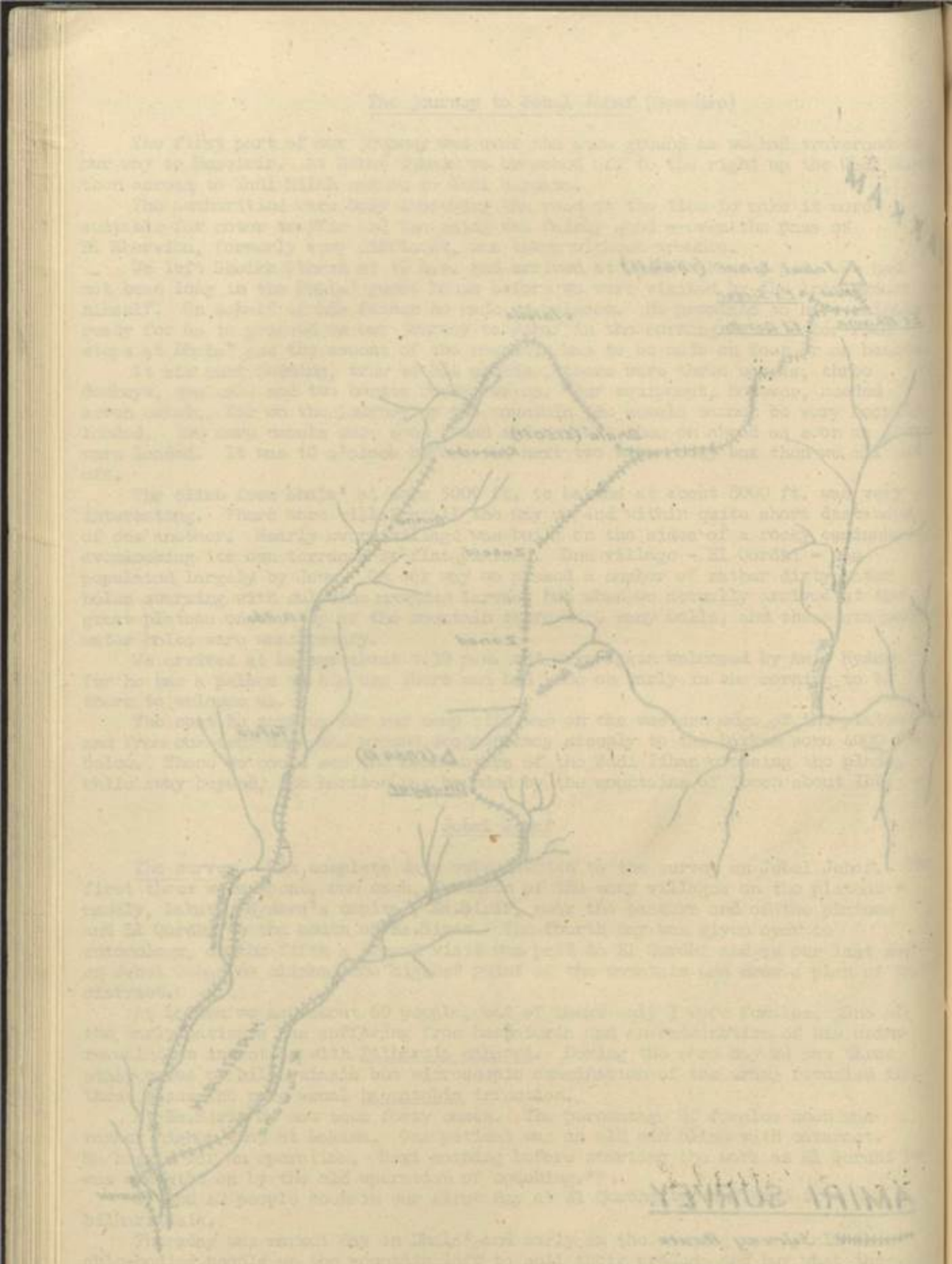


Below his house was a stagnant pool used for washing clothes. There we caught many mosquito larvae but they were all culicines. Then in the puddled water at a neighbouring well head we caught a few anopheline larvae. In the channels running from this well to the fields we found many snail shells. These were collected for identification.

Growing on the flat ground amongst the villages we saw potatoes, sweet potatoes, carrots, lucerne, qat and tobacco. There were many wells and a plentiful supply of water.

On Friday we spent some time in the Jewish quarter of El Qordhi and saw thirty Jews - 18 males and 12 females. On this same day we saw a number of Arab boys with scabies and learned of an outbreak in a school nearby. In the evening camels arrived from Dhala' to take us back but we decided to stay on for another day.

On Saturday we rode to the village of El Haql and from there climbed the steep rock called Jebel Khudheir whose top forms the real peak of Jehaf. At the very top there was a house on whose roof we lay to take our bearings and draw our map. To the south and east lay the irregular plateau of Jehaf. There we could count some twenty villages, every one built on the crest and sides of a rocky outcrop. Among those in the foreground was Lakama crowned by Hydara's castle. Between the villages there were fields of cultivation and in every other field a well. Away to the right (west) lay the plain of Dakkam crossed by the Wadi Tiban, and beyond, on the skyline, the mountains of Yemen. Behind us to the north and far below we could see the Yemeni border town of Qa'ataba.

As we came down from our perch we found in a hole in the rock a pool swarming with culicine larvae.

Next morning our camels were loaded and off by 7.30 a.m. We ourselves followed on horseback at 8. Our party was 7 camels, five donkeys, with our boys, two horses with ourselves and a dozen footsoldiers - an escort provided by Amir Hydara.

We got to Dhala' by 11.30 a.m. and learned at the guest house that the Frontier's Officer (Capt. B. W. Seager) was staying at Safra, so we went across to see him.* He had just received a letter from Seiyid 'Afif of Dhubiyat saying that there was an outbreak of acute conjunctivitis there and asking for medicines. Capt. Seager suggested that we should take Dhubiyat in our stride on our way to Thumoir and do what we could to help the Seiyid.

This meant cancelling our motor lorry and arranging again for camels and donkeys but it also meant seeing another part of the Amiri country and doing part of our survey in the middle heights, so we were quite glad to agree.

We left Dhala' for Dhubiyat at 8.30 next morning.

1. Examination of the people on Jebel Jehaf

Of the 225 people seen on Jebel Jehaf, 194 were males and 31 were females. 195 were Arabs and 30 were Jews. The following table gives these figures in fuller detail as to sex and age:-

	Arab Male	Arab Female	Jewish Male	Jewish Female
0 - 1	0	1	0	0
1 - 2	2	1	1	0
2 - 10	53	9	8	4
10 - 15	24	2	2	2
15 - 45	82	5	5	4
over 45	15	1	2	2
Totals	176	19	18	12

* The Camp at Safra is a permanent camp of the Government Guards. The housing both for the men and the officers was good.

Accommodation was adequate and the buildings well ventilated. Water was supplied from a well on the premises and used by the camp only. No special malarial precautions were taken at the well head but we found no mosquito larvae. (See however, malarial report).

Latrine accommodation is supplied both for officers and men. The men's latrines are shallow holes dug into the rock of the hillside - this means that they are cumulative - and the men prefer to find some secluded spot further up the hill.

Occupations 108 Arab males gave details of their occupations as follows:-

Landworkers	60	soldiers	24	shepherds	9	schoolboys	8
shopkeepers	5	stablemen	2	masons	2	schoolmasters	2
camelman	2	watchman	1	oil miller	1	houseservant	1

14 Jewish males gave details of their occupations as follows:- weavers 6 (one of whom was also schoolmaster), blacksmith 1, schoolboys 6, clerk 1.

Intelligence

	Arabs (143)		Jews (20)	
	M.	F.	M.	F.
Good	115	6	12	7
Fair	20	1	1	0
Poor	1	0	0	0

Literacy Males only. Arab 41/125, Jew 10/18.

Physique

	Arab		Jew	
	M.	F.	M.	F.
Satisfactory	54	11	8	5
Less than satisfactory	93	6	3	5
Poor	21	0	0	4

Cleanliness

	Arab						Jew					
	Head		Body		Clothes		Head		Body		Clothes	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Good	18	1	21	0	9	0	2	0	5	1	2	2
Fair	143	15	120	17	103	6	14	11	10	9	12	6
Poor	14	1	31	1	57	13	1	1	1	2	3	4

Signs suggesting dietetic deficiency. Rickets - Arabs under 10, 10/66; under 15, 13/92. One adult male had an obvious rickety rosary.

Teeth

	Arabs (192)	Jews (28)
Good	106	19
Fair	52	4
Poor	34	5

Gums

	Arabs (182)	Jews (29)
Good	53	12
Spongy	107	14
Gingivitis	18	3
Pyorrhoea	4	0

Other conditions suggesting dietetic deficiencies. Night blindness 5 Arabs (male), angular stomatitis 1 Arab male, dry skin and phrynoderma 13 Arabs and 2 Jews (see other skin conditions).

Eye conditions. Trachoma - Of 178 Arabs 41 (23%) showed signs of trachoma in the following stages. Tr.I 33, Tr.II 5, Tr.III 3, Tr.IV 0. The under 15 percentage was about 30 (29/82) while the over 15 was 12½ (12/96).

Of 14 Jews 8 showed signs of trachoma in the following stages. Tr.I 5, Tr.II 2, Tr.III 1, Tr.IV 0. All the Jewish cases were in the under 15 groups (8/10).

Other Eye conditions - Acute conjunctivitis 2 Arabs, 1 Jew, blepharitis 1 Arab, epiphora 1 Arab, squint 1 Arab, acute corneal ulcer 1 Arab, conical corneal 1 Arab, cataract 3 Arabs, blind in one eye 2 Arabs (one old panophthalmitis and 1 corneal opacity). All the blind eyes were in people over 45.

Of the 5 cases of night blindness noted, 4 were in the 15 - 45 and 1 in the 2 - 10 group.

Heart conditions. 2 Arabs were seen with mitral systolic murmurs and cardiac enlargement.

Pulmonary conditions. 3 Arabs and 1 Jew had bronchitis. Asthma 1 Arab, pulmonary tuberculosis 1 Arab.

Skin conditions. Arabs. Phrynoderma and dry skin 13, scabies 12, bahaq 12, Yemen ulcer 8, septic spots 8, favus capitis 9, ringworm 3, bashash 1, acne 1, leucoderma 1, pediculosis corporis 1, (69/195 showed skin disease).

Jews. Phrynoderma and dry skin 2, ringworm 1.

Conditions of bones and joints. 1 Arab with a poorly developed mandible.

Deformities. Asymptomatic enlargement of the parotids 1 Arab.***
Lipoma of left side 1 Jew.

*** Asymptomatic enlargement of the parotids is fairly common in boys in South Arabia - especially Sana' where the local name of the condition is "ratoil".

Evidences of Malaria. Of 187 Arabs examined 27 (14%) had some enlargement of the spleen.

Of 26 Jews 2 (8%) had some enlargement of the spleen.

In the 2 - 10 group 7/68 had enlarged spleens (1/10 Jews, 6/58 Arabs)

Splenic index 10%.

In this group the details of splenic enlargement were as follows:-

To 1 finger's breadth below the costal margin 1
2 fingers' " " " " " 4
3 " " " " " " 1
5 " " " " " " 1

} average enlarged spleen 2.5.

Evidences of Bilharziasis. 14 persons complained of symptoms suggesting urinary bilharziasis. Of these 8 were verified microscopically; 7 showed the terminal spines of bilharzia haematobia and 1 the lateral spine of bilharzia mansoni. All the cases were in Arab males; i.e. 14/176 (8%) of the Arab males seen on Jebel Jehaf suffered from urinary bilharziasis.

Vaccinal State. Arabs - Vaccinated 25 males (of these 19 were soldiers), had smallpox 23 males, 1 female, i.e. 49/188 protected (26%), not vaccinated 123 males, 16 females.

Jews - vaccinated 2 males, had smallpox 3 males, 1 female, i.e. 6/27 protected (22%), not vaccinated 12 males, 9 females.

Vital Statistics. Arab. 5 women in the 15 - 45 group were seen; all had been married (1 was a widow). Marriage rate 100%. 19 children had been born alive to 5 women. Fertility rate and married fertility rate 3.8. Of 19 children born alive 10 had died in infancy. Infant mortality 10/19 or 526/1000.

Jew. 4 women in the 15 - 45 group were seen; all had been married. Marriage rate 100%. 27 children had been born alive to 4 women. Fertility rate and married fertility rate 6.75. Of 27 children born alive 8 had died in infancy. Infant mortality 8/27 or 296/1000.

Over 45 Combined. 3 women over 45 were seen (1 Arab and 2 Jews). If these are included along with the 9 reported above, then 12 women were seen, all of whom had been married. Marriage rate 100%. 62 children had been born alive to 12 women. Fertility rate and married fertility rate 5.16. Of 62 children born alive 25 had died in infancy. Infant mortality rate (25/62) or 403/1000.

Morbid conditions complained of

	Arab			Arab			Jew	
	M.	F.		M.	F.		M.	F.
fever	48**		coryza	20	2		4	1
haematuria	4		cough	29	4		0	0
pain on micturition	4		asthma	3				
bilharziasis	6		bronchitis	1				
diarrhoea	1		running nose	1				
spondylitis deformans	1		dyspepsia	4	1			
whooping cough	2		ascaris infection	2				1
lobar pneumonia	1		joint pains	7	0		1	1
pleurodynia	1		snake bite	1				
pulmonary tuberculosis	1		injuries	2				
tuberculosis lumbar spine	1		deaf	4				
otitis media	3		scabies	6				
epilepsy	1		measles	1				

Comment. Jebel Jehaf is taken as typical of the high plateaux in the Amiri area. It will be noted that well over half of the Arab males are employed in agriculture. The Jewish community is neither agricultural nor pastoral but is mainly employed in handicrafts. Other points of note are:-

(i) The incidence of bilharziasis is higher here than in any part of the Protectorate yet surveyed.
(ii) Malaria, although not endemic, occurs frequently in adults who visit neighbouring districts, especially the Dakkam.
(iii) Infant mortality is high even for the Protectorate, but the figures may not be significant.
(iv) Trachoma is not particularly common.
(v) Literacy is relatively high.

**Note:- The fever cases had been mostly to the Dakkam.

2. Nutrition

The general standard of physique was only fair. On the whole the Jews seemed better nourished than the Arabs. Meals were taken three times a day.

Diet. The principal article of diet was dukhn (bulrush millet or Penesetum typhoideum). The bread made from this is called Marmo. The whole head of the grain including the core is ground so that the resulting flour is almost half straw. All the 52 people questioned used dukhn. Other grains used were dhora' (76%) barley (24%) ghorba (21%) wheat (13%) and hind (11%).

Meat. Not much is used; 7% said they never had any, 50% some once a week, 38% once a month, 5% almost daily.

Fish. Only 5% of the people ate fish, and they only occasionally.

Milk. Milk is used mixed with buttermilk for dipping the bread in before eating. For 60% of the people this was the only milk they had. 20% said they had up to 1 pint of the milk-buttermilk mixture to drink in addition, 20% said they did not use milk in their diet.

Vegetables. 90% of the people take vegetables once a week. The vegetables available are carrots, leeks, onions, radishes and turnips. (Most of the vegetables grown are sold).

Fruit. Except dates which they all eat, fruit is very rarely eaten.

Salt. Adequate.

Comment. In relation to the fertility of their surroundings the diet is very unsatisfactory. Vegetables are grown on the plateau but nearly all are taken to the weekly market. The occurrence of rickets, night blindness, phrynoderma, and other unhealthy conditions of the skin are obvious signs of the dietary defects. Vitamins A, C, and D would seem to be especially deficient and in many cases there is an almost complete absence of first class protein.

3. Water supply

The whole plateau is lavishly supplied with wells. These are usually about 30 ft. deep. Some of the villages perched on the tops of rocky outcrops may be as far as a mile from a well and all the water is carried by hand, although it is usually drawn by animals. No special protection is given to the well heads, but owing to the nature of the wellhead apparatus these are raised from the ground level and have some natural protection. The wells are stone-lined but not cemented.

The amount of water available seems to be abundant not only for washing cooking and drinking, but also for irrigation.

4. Sanitation

Disposal of domestic and dry refuse. This is tipped over the rockside upon which the houses are built.

Disposal of excreta. Channels are provided both in the houses and on the rooftops. These are principally for conducting urine to the outside, but sometimes they are used for defaecation and the faeces are afterwards flushed down with water.

More usually some secluded spot on the rock side is sought and there "final disposal" left to the sun, the wind and the rain. Faeces are sometimes applied as a plaster to the outlying parts of the roof.

Comment. The whole community is agricultural and in nearly every house there are oxen as well as men. The mixed aroma of stable, byre and human latrine is very noticeable on entering the houses.

5. Housing

General On the Jehaf plateau there are over twenty small villages with a population probably of about 2,000 in all. In every case the villages are built on the summit and sides of low hills or outcropping rocks rising from the general level of the plateau. The hillside is terraced for cultivation.

Materials used in the construction of houses All the houses are of stone - the rafters are of undressed timber. From outside the stones are seen to be roughly hewn cubes. They are unplastered outside but inside there may be some mudplastering and the principal room or rooms may be whitewashed.

Notes on the number of occupants in houses:-

Arabs			
Rooms per house	No. of houses	No. of persons	Average per room
1	28	67	2.4
2	34	201	3.0
3	30	147	1.6
4	14	107	1.9
5	6	58	1.9
6	5	48	1.6

Arab overall average 2.1 per room.

Jews			
Rooms per house	No. of houses	No. of persons	Average per room
1	14	17	1.2
2	3	16	2.7
3	5	13	2.2
4	4	17	1.1
5	1	5	1.0

Jew overall average 1.6 per room.

Overall average Arab and Jew 2.0 per room.

Ventilation. The rooms were very dark but nearly every room had one small unglazed window 9" x 9" some had two. The door leading into a room from the dark stairway was usually about 5 ft. high and 2 ft. 6 in. across.

In most houses having more than one storey (i.e. more than one room) there is an irregular inside stair which is quite dark. At some point on the stair there is an obstruction, which may be simply part of a tree trunk, to prevent the goats and other animals on the ground floor from coming up. There are many flies and some of these are biting flies of the Stomoxys type.

6. Special investigations re Malaria

General. The survey covers a high plateau area of the Amiri country. Here most of the people are small crofters and a few are shepherds. The general standard of living is just above the subsistence level. A disproportionate amount of the produce of the land seems to be sold, and in spite of the fertility of the plateau the people are poorer than one would expect.

Communication with the outside. The main caravan routes from Jebel Jehaf are, to Dhala' and thence to Aden, and to Qa'ataba and thence to Yemen. The plain between the Yemen border and Jehaf is the Dakkam. There are a few immigrants from Dakkam on Jehaf. Dakkam is notoriously malarious and most of the fever cases seen on Jehaf had been in the Dakkam.

Up to the time of the survey quinine was not used by the people of Jebel Jehaf.

Mosquitoes. Anopholines - No adults were found. A few larvae were found in puddles beside the wells.

Culicines - Culicine adults were caught and sent for identification.

All permanent pools and puddles were swarming with culicine larvae.

Anopheline breeding places seem to be few and could easily be eradicated by oiling.

7. Special investigations re Bilharziasis

Many snails were found in the irrigation channels leading from the wells and in the fields. Specimens were collected and sent for identification. The report from the British Museum is as follows:-

Vitrina arabica (Thiele)
Dejeania leucosticta (Mts.) (juv)
Zonites sabaeus (Mts.)

Prof. P. A. Buxton's comment to the effect that none of these snails is a known carrier of bilharziasis has already been quoted (see Museimir report).

Return to Dhala'. This has already been mentioned at the beginning of this report. Several cases were seen at Dhala' and some of them had bilharziasis. A few adult anophelines were caught and as Dhala' is a holiday centre from Aden both of these facts are of importance.

Dhala' to Dhubiyat. Dhala' is in the middle heights and is situated on a plain at 5000 ft. above the sea. Dhubiyat lies on an isolated extension of this same plain. Just behind Dhubiyat the altitude of the plain rises to 5800 ft.

The journey from Dhala' to Dhubiyat is under twelve miles. We left Dhala' just before 9 a.m. The ride took us through some pleasant fertile country with some good shady trees. We passed the villages of Zuboid and Zanad and then came to Ghail Radda where we stopped to make a collection of the snails which were abundant there.

About midday we sighted Dhubiyat across a neck of land joining it to the Dhala' plain. In Dhubiyat we were welcomed at a large dilapidated castle by Seiyid Afif himself. A sheep had been slain on his doorstep and we had to enter across its still kicking carcass. The village is inhabited almost exclusively by seiyids and in days gone by they used to be very powerful and ruled over a wide area of land, but some time ago their power was broken by the Amirs of Dhala'. This may explain the appearance of broken down grandeur in the castle and the despondent appearance of the Seiyid himself. He is somewhat taller than the average Arab of South Arabia - a sad, unsmiling man and very silent. The castle itself is a five or six storey building but only the upper two storeys are in use. The back part of the building has collapsed in ruin and no attempt at repair has been made. The entry now used is up over the débris at the back and in by a door on the second top storey. The deserted lower rooms of the third storey from the top are used to house the cattle. The parts of the castle below are only used as latrines. There is no other latrine accommodation in the house. We were received by the Seiyid in a room opening off his roof courtyard and there we were housed for the next two days.

The Survey. On the afternoon of our arrival we saw some 14 people of the castle. Slides stained with methylene blue showed many very fine bacilli in the pus from the cases of conjunctivitis. These were almost certainly Koch - Week's bacilli.

Late at night we were visited by the Seiyid and some other notables of the village. They seemed to be a peculiar suspicious people - at one moment they were anxious that we should stay with them and attend their sick, and at the next hinting that we ought to be getting on our way. Next morning the Seiyid told us that we had seen all the sick folks but he later gave us permission to sit outside another house down in the village and there we saw some 60 people.

In the evening we walked round the village and in a stagnant pool beside one of the mosques found some culicine larvae. The pool was almost solid with tadpoles.

Later we walked out of the village to the edge of the plateau and looked down into the valley some 2000 ft. below. To us there seemed no way down and the idea of descending that precipice on the morrow was not a little terrifying.

Next morning it was 10 a.m. before we got away. The camels went north to a somewhat easier pass but we were marched straight to the edge of the precipice. We seemed to go down and down for a long time and the yellow strip of sand below which marked the Wadi Tuwena was still as far off as ever. The descent took two hours and was very hot work. In a cave at the bottom we had some coffee while our clothes lay out in the sun to dry.

Our way now lay along a narrow ravine. Here and there little trickles of water came out of the side of the rock and formed into pools - the upper waters of Wadi Tuwena. The wadi continued to be narrow and we travelled on between great high rocks until well on in the afternoon.

Wherever a little soil had accumulated, either in the wadi or up a side gully, it was cultivated and we saw a few rather poor villages. We passed many water holes and one good well.

About 2.30 p.m. we left the Wadi Tuwena by its left bank and passing over Habilain reached Wadi Hardoba. Our objective was the village of Thumeir.

When we came in sight of the village we stopped and sent a messenger on ahead with a letter to the Sheikh. Meanwhile we sought the shelter of some bushes and had some food.

We were now in Qoteibi country. The Qoteibis are a sub-tribe technically under the Amir of Dhala' but never very settled.

About 4.30 we rode into the village of Thumeir to find that the Sheikh was absent and no responsible person could be found. However the people welcomed us and directed us to a camping ground. The camels came in soon after 5 p.m. and we began to put up our tents. Just then a party of armed men arrived on the scene and told us that we could not stay. They said they objected to the Government putting a motor road through their country and spoiling their camel traffic and that they would have no Europeans on their soil.

I agreed that if they did not want us as doctors we would move on but I begged the privilege of tired travellers arriving among them at sunset and asked that we be allowed to stay the night. With no very good grace they agreed.

Later the villagers who had welcomed us came back to tell us that these warriors were tribesmen from the hills who had been stirred up by one Seiyid Hussein ed Dubagh.

After that there was a lot of mysterious and sinister talk, the outcome of which was that we felt it wise to adhere to our bargain and move on over the Qoteibi border next morning.

This deprived us of a survey in the upper wadis of the Amiri country as we had planned, but it took us back into Haushabi country where at El Milah we settled for a few days, making the survey already reported.

1. Examination of the people at Dhubiyat

Of 82 people seen, almost all Seiyids, 70 were males and 12 females in the following age groups:-

	M.	F.		M.	F.
2 - 10	17	5	10 - 15	10	5
15 - 45	33	2	over 45	10	0

Occupation. 46 males gave details of their occupations as follows:-

landworkers	20	camelmen	8
soldiers	3	schoolboys	5
shepherds	8	house servant	1
merchant.	1		

Intelligence. Good 49 males 6 females
Fair 3 " 0 "

Literacy. 24/70 males could read and write. None of the females was literate.

Cleanliness

	Head		Body		Clothes	
	Male	Female	Male	Female	Male	Female
Good	12	2	16	0	13	0
Fair	54	8	51	9	47	5
Poor	4	0	3	0	10	5

Physique

	Males	Females
Satisfactory	38	5
Less satisfactory	27	5
Poor	3	0

Signs suggesting dietetic deficiencies. Rickets - no cases seen.

Teeth	M.	F.	Gums	M.	F.
Good	35	4	Good	12	4
Fair	22	7	Spongy	46	8
Poor	7	0	Gingivitis	4	0
			Pyorrhoea	0	0

Other conditions suggesting defects in diet - dry skin 1, angular stomatitis 1.

Eye conditions.

Trachoma. Of 71 people examined 10 showed trachoma in the following stages:-

Tr.I 8, Tr.III 2. Of the 10 cases 7 were in the 2 - 10 and 1 in the 10 - 15 group. There were no cases in the 15 - 45 group.

Other eye conditions:- acute muco-purulent conjunctivitis (K.W.) 4, squint 1, pterygium 1, blepharitis 1 (with ectropion of lower lid).

Heart conditions. None noted.

Pulmonary conditions. 33 people complained of cough not only one had signs in his chest and was diagnosed as bronchitis.

Skin conditions

bahaq	7	septic spots	1
leg ulcer	5	favus capitis	1
ringworm	2	acne vulgaris	1
tinea of nails	1	bashash	1
warts	1	dry skin	1

Bone conditions. None noted.

Deformities. Lipoma of side.

Evidences of Malaria. Splenic enlargement was noted in 20/79 cases. In the 2 - 10 group 5/21. Splenic index, 24.

Of the 5 cases in the 2 - 10 group,

3 had enlargement 1 finger's breadth below the costal margin } average
1 " " 2 fingers' " " " " " } enlarged
1 " " 4 " " " " " " } spleen 1.8

Evidences of schistosomiasis. One person reported haematuria, but no eggs were found in the urine.

Vaccinal state. Vaccinated, 14, all males. Had smallpox, 26. Not vaccinated 40. 50% overall protection. Females 10% protected.

Vital statistics. Only 2 women in the 15 - 45 age group were seen. Both were married (marriage rate 100%).

12 children had been born alive to the 2 women (fertility rate and married fertility rate 6.0).

Of 12 children born alive 1 had died in infancy (infant mortality 83/1000). Those figures are of course much too small upon which to base any conclusion.

Morbid conditions complained of

fever	29	otitis media	2	joint pains	1
cough	32	haematuria	1	spastic hemiplegia	1
bronchitis	1	lipoma	1	sore throat	1
dyspepsia	5	elephantiasis	1	epilepsy	1

Note:- The time spent in Dhubiyat was insufficient for a proper investigation of sanitation, water supply, housing etc. but the following facts, though meagre are recorded.

Comment. Dhubiyat may be taken as a sample village of the middle heights but in some senses it is to be regarded as a special village. It houses a community of

Seiyids, none of whom are very poor, so that conditions in general are likely to be rather better than those in other villages of the same area.

The following points are worthy of note:-

(i) The number of males employed in agricultural and in pastoral work is almost equal.

(ii) Malaria is endemic - the splenic index is twice as high as it was on Jebel Jehaf (in this connection it may be worth pointing out that from the malarial point of view Jehaf would seem to be a more suitable place for a holiday resort from Aden than this "middle height" area).

(iii) No bilharzia was found in Dhubiyat, but a few cases were seen in Dhala' at the same level.

(iv) Literacy is relatively high.

2. Nutrition

The general standard of nutrition was satisfactory.

Diet. The staple diet was millet, though Indian corn was also widely used. The millets in use were dhura', ghorba and dukhn, i.e. white and red giant sorghum and bulrush millet.

Consumption of Meat - regularly about once a week.
Milk - the bread is dipped in milk and buttermilk when eaten. A little is used in the coffee, but otherwise very little milk is used.
Salt - Adequate.
Vegetables - Once a week.

Comment. Apart from the high proportion of people with spongy gums very few cases pointing to dietetic deficiency were seen. The diet as reported is, however, very poor in first class proteins and in Vitamins A, C and D.

3. Water Supply

From wells, hand-drawn and carried by the women. The main wells were about half a mile from the village.

4. Sanitation

No special arrangements.

5. Housing

The houses were of stone and sundried mud brick.

Of 24 houses in Dhubiyat

No. of rooms	No. of houses	No. of persons	Average per room	
1	4	18	4.5	
2	6	25	2.2	
3	5	22	1.4	
4	4	24	1.5	
5	1	10	2.0	over all av. 1.9
6	1	8	1.3	
8	1	24	3.0	
10	1	20	2.0	
16	1	25	1.6	

(The last was the large castle. It had many more than 16 rooms but 16 was the maximum in the inhabited part).

In all the houses a minimum provision was made for ventilation.

6. Special investigation regarding malaria

A note should be made of the Dhala' outbreak.

7. Special investigation regarding bilharzia

The snails found at Ghail Ridda were reported on as follows:-

Melanoides tuberculata (Mull.)

and Biomphalaria arabica (M. and P.) neither of which is a proved bilharzia carrier. Nor is another snail found on the Dhala' plateau, Zebintrops ventriculosa Conn.

CHAPTER III

FINDINGS AND RECOMMENDATIONS

The findings and recommendations here presented are based upon the data in chapter II and there is unavoidably considerable repetition although even then the matter repeated is presented from a new angle - the angle of the condition rather than that of the tribal area.

This chapter falls into twelve sections as follows:-

I. A general statement as to the number of the people seen etc. II. Malaria. III. Bilharziasis. IV. Smallpox. V. Skin Conditions. VI. Eye Conditions. VII. Other Morbid Conditions. VIII. Vital Statistics. IX. Sanitation. X. Housing. XI. Nutrition. XII. Water Supply.

The report on leprosy and on tuberculosis is included in that on "other morbid conditions" and the map illustrating the incidence of leprosy is combined with that illustrating the incidence of bilharziasis. A map is also submitted to show the incidence of malaria.

1. GENERAL

In the examination of the people 1,511 individuals were seen in five tribal areas covering 13 different districts.

These may be summarised as follows:-

	Males	Females
Fadhli (Shuqra and Abyan)	130	12
'Abdali (Haski and Waht)	201	67
Subeihi (Tor am Baha, Khor 'Umeira and Wadi Timnan)	307	49
Haushabi (Museimir, Wadi Tiban, Kirsh and El Milah)	390	48
Amiri (Jebel Jehaf and Dhubiyat)	264	41
Total	1,292	219

Showing that the number of males to females examined was as 6 to 1.

The various age groups were represented as follows:-

	Males	Females
0 - 1	6	6
1 - 2	16	6
2 - 10	391	70
10 - 15	192	16
15 - 45	586	79
over 45	101	42
	1,292	219

It should be noted that the proportion of males to females rose as high as 12/1 in the 10-15 group and that the 2-10 group was well represented - the latter being a valuable point in the assessment of the malarial incidence.

The small number of old people seen suggests that the average age at death is low, for there is no objection to the doctor seeing either men or women over 45.

Occupations

Landworkers predominate in Abyan, Tor am Baha, Wadi Timnan, Waht and on Jebel Jehaf.

They are also common in Haski, Museimir, the villages on Wadi Tiban above Museimir, Dhubiyat and El Milah.

Herdsmen predominate in the Khor 'Umeira and Kirsh areas.

They are also common in Haski, Museimir, the villages on Wadi Tiban above Museimir, Dhubiyat and El Milah.

Herdsmen include keepers of sheep, goats, cows and camels.

The camel herds are also porters.

Fishing is a common occupation in Shuqra and Khor 'Umeira; Some people from Waht and Abyan also follow this occupation.

Woodcutters, soldiers, shopkeepers and schoolmasters were found scattered irregularly over the whole area.

Weavers, (who are Jews) were met on Jebel Jehaf, and charcoal burners at El Milah.

INTELLIGENCE

No standard tests were carried out and the general impression gathered in the course of conversation during the examination, was the basis of these records. Only 8 cases of obvious mental defect were seen during the whole survey. The poorest figures were returned by the people of Shuqra, Khor, 'Umeira and the villages on Wadi Tiban above Museimir while the best were the Jews of Jebel Jehaf, the Seiyids of Dhubiyat, the Arabs of Jebel Jehaf and the people of Museimir.

LITERACY

The average literacy among adult males throughout the whole survey was 20%. This varied from the lowest averages at Khor 'Umeira (2%) and Museimir (9%) to the highest at El Waht (46%) and Dhubiyat (34%) - the two Seiyid centres. If the Jewish population is considered separately it shows a literacy among adult males of 60%. Females are illiterate throughout.

CLEANLINESS

The figures for general cleanliness are as follows (in percentages):-

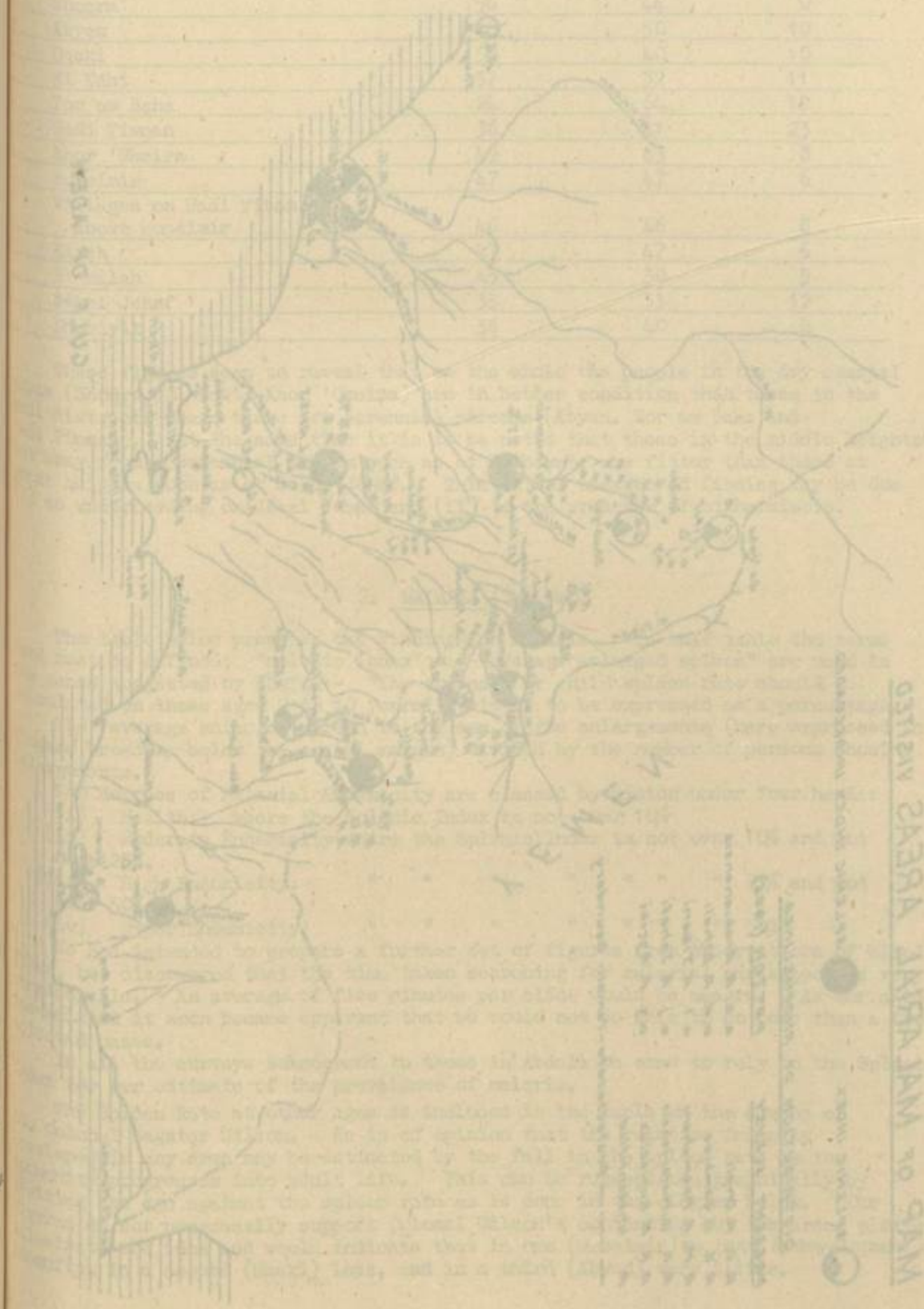
	Satisfactory	Less satisfactory	Poor	
Abyan	25	75	0	children with clothes
Haski	11	64	25	several lousy
El Waht	46	48	6	
Tor am Baha	20	71	9	several lousy
Wadi Timman	18	75	7	
Khor 'Umeira	22	71	7	children without clothes
Museimir	35	60	5	
Villages in Wadi Tiban	38	50	12	several lousy
Kirsh	16	70	14	
El Milah	11	73	16	
Jebel Jehaf	10	70	20	
Dhubiyat	20	70	10	

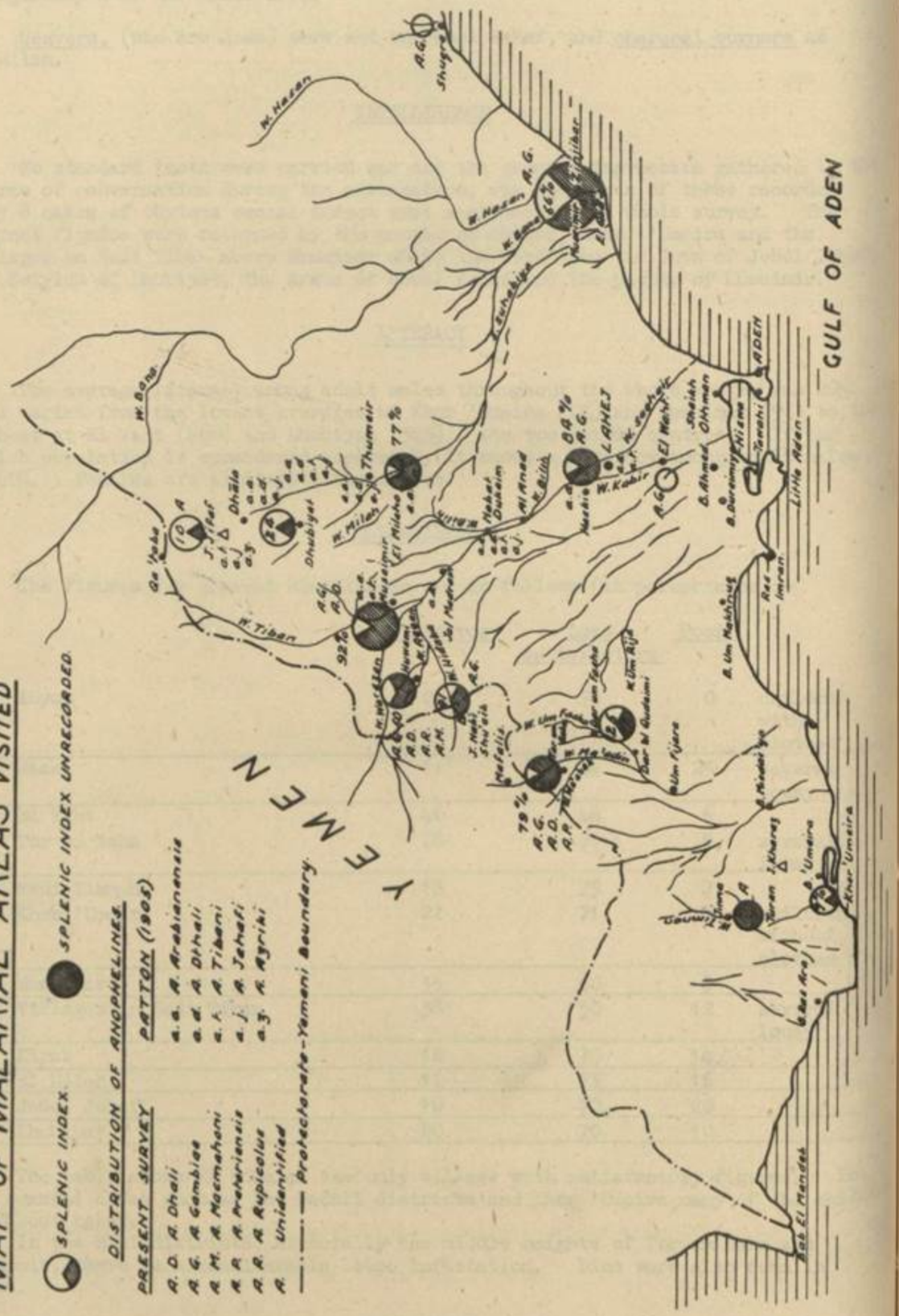
The table shows El Waht as the only village with satisfactory figures. In the coastal areas such as the Fadhli districts and Khor 'Umeira many of the children run about naked.

In the hill districts, especially the middle heights of Tor am Baha and Museimir, there is a considerable louse infestation. Lice were also seen in Haski.

PHYSIQUE

No scientific standards were adopted to assess this item. An estimate was made from the general appearance of the individual, his musculative, the tone of the skin, and nutritional state.





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The figures are as follows in percentage of those seen:-

	Satisfactory	Less Satisfactory	Poor
Shuqra	56	44	0
Abyen	40	50	10
Haski	50	40	10
El Waht	57	32	11
Tor am Baha	24	64	12
Wadi Timnan	36	41	23
Khor 'Umeira	49	43	8
Huseimir	47	47	6
Villages on Wadi Tiban above Huseimir	46	46	8
Kirsh	47	47	6
El Hilah	45	50	5
Jebel Jehaf	35	53	12
Dhubiyat	56	40	4

These figures seem to reveal that on the whole the people in the dry coastal areas (Shuqra, El Waht, Khor 'Umeira) are in better condition than those in the wadi districts where there are perennial streams (Abyen, Tor am Baha and Wadi Timnan). At the same time it is to be noted that those in the middle heights, but away from a perennial stream such as at Dhubiyat, are fitter than those at great heights such as at Jebel Jehaf. This rather unexpected finding may be due (i) to underfeeding on Jebel Jehaf and (ii) to the presence of bilharziasis.

2. MALARIA (See Map)

The table below presents the findings on malaria. In that table the terms used must be defined; "splenic index" and "average enlarged spleen" are used in the sense suggested by SINTON:- "The ordinary or child spleen rate should be calculated on those aged 2 to 10 years", this is to be expressed as a percentage.

The "average enlarged spleen is the sum of the enlargements (here expressed in fingers' breadths below the costal margin) divided by the number of persons showing enlargements."

The degrees of Malarial Endemicity are classed by Sinton under four heads:

(i) Health:- where the Splenic Index is not over 10%
(ii) Moderate Endemicity where the Splenic Index is not over 10% and not over 25%.
(iii) High Endemicity: " " " " " " " 25% and not over 50%.
(iv) Hyper Endemicity: " " " " " " " 50%

We had intended to prepare a further set of figures from observations of blood films, but discovered that the time taken searching for malarial parasites was very considerable. An average of five minutes per slide would be meagre. As our slides accumulated it soon became apparent that we would not be able to do more than a few selected cases.

In all the surveys subsequent to those in'Abdali we came to rely on the Splenic Index for our estimate of the prevalence of malaria.

The Spleen Rate at other ages is included in the table on the advice of Lt. Colonel Bagster Wilson. He is of opinion that the relative immunity developed in any area may be estimated by the fall in the spleen rate as the community progresses into adult life. This can be represented graphically by plotting the age against the spleen rate as is done in the diagram below. Our figures do not necessarily support Colonel Wilson's contention but the areas plotted illustrate the idea and would indicate that in one (Huseimir) we have a development of immunity, in a second (Haski) less, and in a third (Abyen) very little.

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Place	Splenic Index	Average enlarged spleen	Spleen rate under 2	Spleen rate 10-15	Spleen rate 15-45	Spleen rate over 45	Anopholines found	Anopholine breeding places	Other Mosquitoes	Grade of malarial endemicity	Clinical cases seen	Comments
Shuqra.	0	0	0	1/6	-	-	A.gambiae larvae only.	In a derelict well.	C.fatigans. C.sitiens larvae in mosque pools.	Healthy.	1	-
Abyen.	66	2.3	-	50	48	50	A.gambiae adults.	-	-	Hyper-endemic.	5	-
Haski.	84	2.0	33	93	45	42	A.gambiae adults and pupae.	Pool at Hussaini.	-	Hyper-endemic.	68	Parasites were found in 20/67 slides examined. Both M.T. and B.T. forms. Hb. average 75%.
El Waht.	0	0	0	2/48	0	0	A.gambiae adults only.	None found.	None found.	Healthy.	34	Hb. average 78%.
Tor am Baha.	79	3.0	-	81	45	45	A.gambiae, A.dhali, A.pretoriensis. larvae. A.gambiae adults.	Irrigation channels and weedy edges of streams.	C.aethiopicus C.sinniticus C.decens larvae.	Hyper-endemic.	32	Soldiers at Tor am Baha, spleen rate 41%.
Dar am Farsha.	25	2.5	-	10	14	10	-	-	-	Moderately endemic.	-	-
Khor 'Umeira.	7	1.6	-	0	4.0	6.0	None found.	None found.	None found.	Healthy.	6	Danger of pools in the wadis after floods.

MALARIA

TABLE

Wadi Turan.	-	adult 2.7	-	-	over all 52		Anopholine larvae found.	Weedy edges of Ghail Hadharoof.	-	Probably Hyper-endemic.	4	Hardly any children were seen here.
Museimir.	92	2.5	25	78	53	20	A.gambiae A.dhali Adults and larvae.	Weedy edges of backwaters and pools Wadi Tiban.	-	Hyper-endemic.	38	-
Villages on Wadi Tiban above Museimir.	85	3.0	-	100	67	27						
Wadi Hidaba.	41	2.1	50	50	63	30	A.gambiae adults only.	None found.	None found.	Highly endemic.		All adult
Wadi Natid.	60	2.3	-	55	38	30	A.gambiae A.dhali A.rupicolus A.macmahoni	Hot springs Huweimi. Puddles by wadi at Qoreina. Water pools at Kirsh.	Some larvae.	Hyper-endemic.	70	Anopholines caught were A.gambiae.
El Hilah.	77	3.3	-	-	39	25	-	-	-	Hyper-endemic.	36	Spleen rate in:- Road workers 23% Soldiers 33%
Jebel Jehaf.	10	2.5	-	8	17	5	Very few larvae found but definitely identified as anophelines.	Puddles beside wells.	Permanent pools swarming with culicine larvae.	Healthy.	48	Adults travel to malarial areas and get infected.
Dhubiyat	24	1.8	-	33	18	40	-	-	Mosque pools swarm.	Moderately endemic.		

The Mosquitoes of Aden and the Western Protectorate

On August 31st 1905 Lieutenant (now Professor) W. S. PATTON of the I.M.S. read a paper before the Bombay National History Society which is, so far as we know the only published work on the Culicids of South Arabia. Patton's paper is called "The Culicid Fauna of the Aden Hinterland, their Haunts and Habits" and we are very grateful to him for lending us his only remaining copy for the purposes of this survey.

Patton describes five anopheles from the "Aden Hinterland".

Anopheles arabiensis
" d'thali
" tibani
" jehafi
" azriki

In the above table it will be seen that five anopholines occur in our series.

Anopheles gambiae
" d'hali
" pretoriensis
" macmahoni
and " rupicolus

Anopheles arabiensis and Anopheles gambiae may be equated with one another - this mosquito has also been called A. costalis. During the survey it was found in every area from which anopholines were identified. It was found in wells and pools in streams and in irrigation channels. This agrees with Patton's observations that this is "the common anopheles of the district". Professor Buxton commenting upon the various mosquitoes sent home by the survey said that he expected we would find that of them all A. gambiae would prove to be the main transmitter of malaria- an opinion with which Patton's paper is in agreement.

Anopheles d'thali and Anopheles dhali. Patton spells the name of the district in which this was first found D'thala. Today most Arabists would accept Dhala' as the correct spelling of the place name and we hope the simpler form here used for the mosquito will be generally adopted. The larvae were found at Tor am Baha, Museimir and at three of the four places from which larvae were taken near Kirsh i.e. near the hot springs at Huweimi, in the puddles by the Korein spring in Wadi Natid and in weedy pools on Wadi Aqqan. Patton considered that it was a carrier of malaria but Sinton states that there is no evidence that it can transmit the disease.

Anopheles tibani and Anopheles pretoriensis:- None of the specimens we sent home were identified as A. tibani but the description Patton gives of A. tibani is very like the standard description of A. pretoriensis. The only larvae of A. pretoriensis found by us was in the Tor am Baha area at the weedy edges of the stream. This again agrees with Patton's observation for A. tibani. "It only breeds in running water and pools connected with it". On the other hand Patton found A. tibani "in all the rivers and springs in the hinterland as far up as Jehaf". His experiments with A. tibani suggested that it is not a carrier of malaria.

Anopheles jehafi:- None of the specimens sent home by us has been named A. jehafi. The larvae we did send from the Jehaf area were too young to be identified except as anopheline. Patton says this species resembles A. cinereus and he suggests that it may transmit malaria.

Anopheles azriki:- This mosquito was not found during this survey. It was found by Patton only in the Jehaf area. He says that it resembles A. turkhidi.

Anopheles rupicolus and Anopheles macmahoni. These larvae were collected from two places in the Wadi Natid:- a weedy pool near the hot springs of Huweimi and from the edge of the water holes at Kirsh. The following notes from Dr. Leeson were sent on by Professor Buxton. "These two species are extremely interesting and cannot be identified with confidence from the larvae alone. One of them, rupicolus, is at present only known from one little hill in the Sudan. The other, macmahoni, is only known from Kenya".

Anopheles culicifacies is the common anopheline of Aden Colony and is also called A. adenensis, but it was not found by us in the Protectorate, nor is it mentioned in Patton's paper.

Anopheles barbirostris has also been reported from the Colony.

Other Mosquitoes.

Culicines. Here again the number of species mentioned by Patton is almost the same as that collected during this survey but the names are different:-

Culex arabiensis described by Patton in Aden & the Protectorate (Ulub).
Culex pipiens " " " as abounding in the "
Culex concolor " " " from Dhala.
Culex fatigans " " " and found during the survey at Shuqra.
Patton says it abounds throughout the Protectorate.
Culex sitiens among the larvae collected at Shuqra on this survey.
Culex aethiopicus " " " " " Tor am " " "
Baha
Culex sinaiticus " " " " " " " " "
Culex decens " " " " " " " " "

Aëdes. We found no Aedes mosquitoes in the Protectorate. Patton describes Stegomyia fugens at Ulub, which place I have not been able to identify. He says "strange to say it has never been found farther up than Ulub. In Sheikh Othman and Aden it is the common mosquito and is a great pest". The larvae most commonly brought in by Aden mosquito hunters at present is Aëdes aegypti.

Taeniorhynchus. Patton also described a banded Arabian variety of Taeniorhynchus tenax which he found at Dhali, Hardeba and Nobat Dukeim.

Recommendations

No area in the Western Aden Protectorate can be said to be free from malaria, but a glance at Table I will show that there are two types of district "healthy" in the malarial sense. These are the dry coastal districts and the highlands above 6000 feet.

Between these we have areas of moderate endemicity in the wadis which are dry for most of the year, high endemicity in areas just a few miles from permanent streams and hyper endemicity in the actual vicinity of these streams themselves.

The accompanying map* illustrates these points quite well.

The dry coastal areas

In these areas larvae were found in derelict wells and in mosque pools. These areas should be the simplest to deal with and work could be begun without delay. Recent outbreaks of malaria, in areas formerly fairly free, have been severe e.g. at Dhala' and in San'a. This suggests that a population unaccustomed to malaria may suffer severely when they are attacked. This underlines the importance of keeping the free areas protected as far as possible.

The derelict well at Shuqra should be filled in and derelict wells elsewhere in the coastal area should be promptly dealt with.

The care of mosque pools may be slightly more difficult but it should be possible to enlist the co-operation of the mosque caretaker and the local ruler and the actual "mosquito hunting and control" could be entrusted to the tribal health orderlies.

The example of El Qara in the Lower Yafa'i country should be widely quoted as propaganda:- In El Qara disease suddenly appeared amongst the people, several died, and a medical officer was asked to go up from Aden. He went and diagnosed malaria. El Qara is a town perched high on a dry barren rock far above the plain. There seemed to be no breeding places for anophelines in the whole town; all the water used is carried from a well in the plain below. Then the mosque pool was visited and there mosquitoes were breeding in legions. The oiling of the water in the pool stopped the epidemic and when some time later another epidemic occurred the people sent to Aden for "the marvellous medicine you put on the water to cure fever"!

While the proper care of mosque pools and the filling in of derelict wells will meet most of the problems, more specialised precautionary measures will need to be taken after local rain storms or when flood water comes down from the interior, and this would be part of the training of the Tribal Health Orderlies at their Health Training Centre to be described in the next chapter.

The areas of the Wadi systems

Wadi Tiban with its tributaries Wadi Warezan, Wadi Akkan and Wadi Natid, Wadi Bana and Wadi Ma'adin are those primarily deserving notice, but as the work progresses every wadi in the area will have to be dealt with and its special problems tackled.

* Facing page 79.

In many cases it is in the weedy edges of pools and streams that the larvae - especially the gambiae larvae - are found. It is suggested as a preliminary measure that the people be taught to keep their irrigation channels etc. free from weeds. It will, however, be obvious that in these wadi areas the malarial problem will not be solved by simple means and when it is decided to make a determined attack on malaria in the Western Aden Protectorate the services of a specialist should be engaged to advise upon draining, oiling, filling, the use of Paris green and all the familiar weapons of the malarialogist.

Granted effective organisation and local co-operation, the Western Aden Protectorate could be largely rid of malaria, but each area will have to be taken separately and the most urgent need would seem to be first the Wadi Tiban from Lahej to above Museimir, then its tributaries especially Akkan, then Wadi Ma'adin, then the Wadi Bana, and then the drier wadis.

Plateaux up to 6000 feet

In these regions there is a regular and quite considerable rainfall, so that malaria tends to be seasonal and sometimes severe. In dry weather the larvae might be kept down by supervision of the well, puddles and the mosque pools, but in wet weather attention will also need to be given to the rain pools.

The Dhala' plateau is especially important because it is one of the few places to which the Europeans of Aden may go for local leave. For long it was thought to be healthy, but now we know that both malaria and bilharzia occur there and precautions should be taken accordingly. During the past few years there have been quite serious outbreaks of malaria on the Dhala' plateau in late summer and in the autumn.

In October 1940 Dr. R. B. SMITH was flown up to deal with malaria among Europeans holidaying at the Safra camp on the Dhala' plateau. Several of the Europeans were seriously ill: fortunately none died. He also saw many cases among the Arab soldiers at the camp. He found anopheline larvae in a water hole three yards in diameter and only 24 yards from the holiday house. Most of the slides examined from his cases shewed the crescents of subtertian malaria, but others were benign tertian infections. (Quartan malaria has also been reported and microscopically confirmed from the Wadi Tiban area).

In October 1942 Dr. SEAL was sent to Dhala' to investigate an outbreak of fever which had been prevalent on the plateau for two months. He took thirty blood slides and malignant tertian parasites were found in seven of them. In his report Dr. Seal names as likely anopheline breeding places, mosque pools, puddles beside wells and pools near a spring beside the Safra camp. He instructed the Arab officer of the camp in the oiling of the pools and suggests that the Dhala' dispensers should add the job of "mosquito hunting" to their duties.

If Dhala' is to be a hill station for Aden an anti-malarial campaign should be carried out on the plateau and a demonstration unit of mosquito control set up there. This would form a natural part of the work of the Training Health Centre referred to in the next chapter.

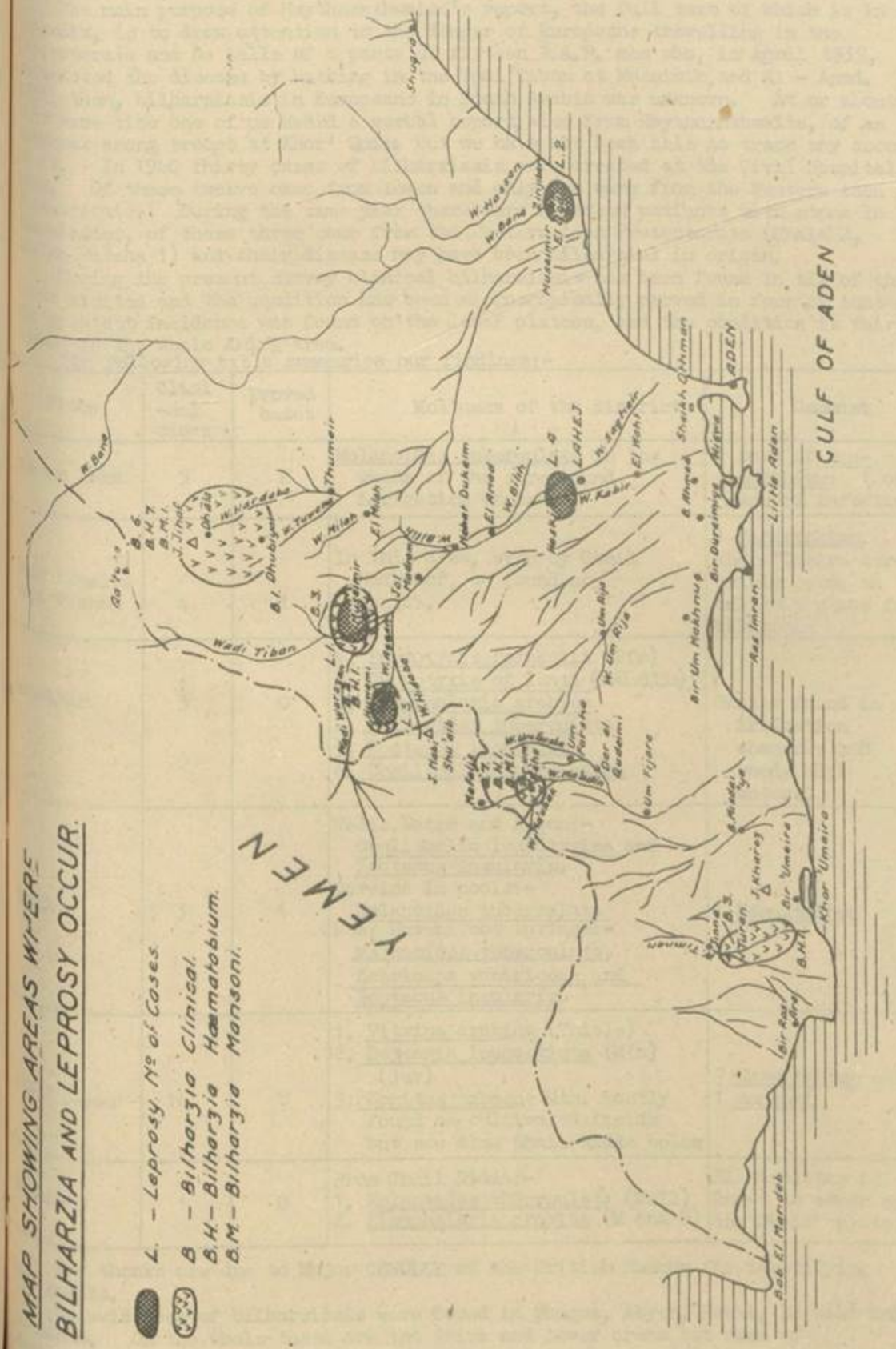
Finally we would urge that in selecting sites for the houses of Political and other officers in the Protectorate - and, a fortiori, sites for rest houses for Europeans, medical advice should be sought and screened rooms provided as well as mosquito nets. This is only to repeat a suggestion made by Dr. PETRIE in an interim report to the Senior Medical Officer in February 1940 after the Tor am Baha survey - there he said "a house is being erected for the Political Officer at Tor am Baha — I hope it will contain a properly planned latrine and at least one mosquito proofed room". Dr. BUCHANAN in forwarding these suggestions to Aden Government strongly supported them.

The amount of invalidism from malaria amongst European officers in the Protectorate has of recent years been very high and we would again urge that as well as being largely preventable it is bad health propaganda. All our official representatives in the Protectorate - officers, clerks, guards and soldiers - should be so equipped and so trained that they become demonstration units of sound hygiene and healthy living.

3. BILHARZIASIS

In 1935 Squadron Leader (now Wing Commander) B. F. HAYTHORNTHWAITE prepared a report for the R.A.F. Medical Service in Aden on "Bilharziasis in South Arabia".

In that report he refers to a case seen by one of us in Ta'iz in 1931 as the first proved case of bilharziasis in South Arabia. From that case a rectal tumour was removed. Sections of this tumour were made in the Haffkine Laboratory Bombay - through the kindness of Col. S. B. PHIPSON and in the R.A.F. Laboratory Aden by Squadron Leader (now Group Captain) E. A. LUMLEY. Both of these laboratories reported the finding of the eggs of S. MANSONI in their sections.



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This case may have been the first proved infection with S. mansoni in South Arabia but bilharzial infection of the urinary tract has long been known. It was among the conditions known to Dr. J. C. YOUNG and others who worked in the Keith Falconer Mission Hospital prior to 1926. Also, we know from information received from Col. M. C. LAKE that the condition was recognised during the last war by the Medical Officer of the 1st Yemen Infantry. This regiment was recruited from the Protectorate.

The main purpose of Haythornthwaite's report, the full text of which is in the appendix, is to draw attention to the danger of Europeans travelling in the Protectorate and he tells of a party of fifteen R.A.F. men who, in April 1935, contracted the disease by bathing in the Wadi Tiban at Museimir and Al - Anad. Until then, bilharziasis in Europeans in South Arabia was unknown. At or about that same time one of us heard a verbal report, also from Haythornthwaite, of an outbreak among troops at Khor' Umira but we have not been able to trace any account of it. In 1940 thirty cases of bilharziasis were treated at the Civil Hospital, Aden. Of these twelve came from Yemen and only one came from the Western Aden Protectorate. During the same year there were nineteen patients with stone in the bladder, of these three came from the Western Aden Protectorate (Dhala' 2, Dar am Farsha 1) and their disease may have been bilharzial in origin.

During the present survey clinical bilharziasis has been found in six of the areas visited and the condition has been microscopically proved in four of that six. The greatest incidence was found on the Jehaf plateau, and the condition is fairly common in the whole Amiri area.

The following table summaries our findings:-

Place	Clini-cal cases	Proved cases	Molluscs of the district	Comment
Tor am Baha	9	2	Melanoides tuberculata in the weeds of the stream and irrigation channels.	1 case of haematobium: 1 of mansoni infection
Khor 'Umeira Wadi Timnan	4	1	In this area, even by Ghail Hadhroof, we found no snails.	1 Haematobium. Khor 'Umeira certainly seems an unlikely place for bilharzia
Museimir	3	0	1. Euryptyxis forskalii (Pfr) 2. Euryptyxis of lunti (Melville) 3. Biomphalaria arabica 4. Melanoides tuberculata 5. Zootecus insularis 6. Obeliscella lucidissima	Snails found in irrigation channels and weedy back waters.
Kirsh	3	1	Wadis Natid and Aqqan:- Obeliscella lucidissima and Zootecus insularis. Qoreina in pools:- Melanoides tuberculata Near Huwemi hot springs:- Melanoides tuberculata, Zebrinops ventricosa and Zootecus insularis.	1 Haematobium
Jebel Jehaf	14	8	1. Vitrina arabica (Thiele) 2. Dejeania leucostieta (Mts) (juv) 3. Zonites sabaeus Mts. mostly found on cultivated fields but see also Ghail Ridda below	7 Haematobium and 1 mansoni
Dhubiyat	1	0	From Ghail Ridda:- 1. Melanoides tuberculata (Mull) 2. Biomphalaria arabica (M and P)	Bilharziasis is known to occur on the Dhala' plateau

Our thanks are due to Major CONOLLY of the British Museum for identifying the snails.

No evidences of bilharziasis were found in Shugra, Abyen, Haski, El Waht and El Milah. On the whole these are the drier and lower areas but some of Haythornthwaite's cases were infected at Al Anad which is not far above Haski and probably the whole of Wadi Tiban should be treated as under suspicion. Opportunities should be taken to do further investigation in all the main wadi systems.

Intermediate hosts. Haythornthwaite in the report already referred to claims to have found:-

Planorbis at Mukeiras and Muscimir
Bulinus at Mukeiras, Dhala' and Muscimir
and Onchomelania at Al Anad; but I do not know whether these observations were verified by a specialist. Commenting on our collection Prof. Buxton writes "none of your snails are well known carriers of bilharziasis. It means that if you want to go further into the matter one would have to carry out a lot of experimental work on local snails unless indeed you search further and discover more sorts of snails".

In 1937 - 38 Dr. SCOTT and Mr. BRITTON of the British Museum were working in the Western Aden Protectorate and they discovered a number of snails, but none of them are well known carriers of bilharziasis. Assuming for the present that our list and Dr. Scott's represent the total list of snails proved to occur in the area then the only one so far under suspicion in regard to bilharziasis, so far as we know, is Melanoides tuberculata. Against Melanoides being the local carrier is the fact that it was not found on Jebel Jehaf, but it is common enough in the Ghail Ridda on the Dhala' plateau and the Jebel Jehaf people frequently come to Dhala'.

In an article on schistosomiasis in the Transactions of the Royal Society of Tropical Medicine and Hygiene DOWDESWELL (April 1938) includes two types of Melanoides as possible carriers of bilharziasis: Melania (Melanoides) nodicincta ('Dohrn) was, he says given by Dye in 1924 as a carrier of bilharziasis in Nyasaland, and Melania (Melanoides) tuberculata (Müller) was given by Gopsill in 1930 as a carrier in the same area. Dowdeswell points out that in neither case was the proof conclusive.

Since the survey one of us has collected snails from Metna on the high plateau in Yemen about Jebel Nebi Shuaib (9000 feet). Bilharziasis occurs in the district and the snails have been identified as

Vitrina arabica Thiele.
Cerastus schweinfiirthi (mts.)
Lymnaea lagostis Schranck.
Bulinis truncatus (Audouin)
Pseudancylus argenteus Conn.

but the following comment is made by Prof. Buxton. "If there is actually native urinary bilharziasis up at that high altitude it is probably transmitted by Bulinus, but it seems probable that at the low temperatures which must prevail, the worm would not complete its cycle in the snail".

Recommendations

It will be clear that the data concerning bilharziasis in South Arabia are very far from complete. All that can be said is that bilharziasis occurs in certain districts, especially in those above 2000 feet, but its absence from the coastal districts must not be taken as conclusive, for in Yemen one of the most bilharzial districts is Zabeed which is almost at sea level.

Zabeed has a fairly plentiful water supply. This suggests that the dryness of the coastal plain rather than its low altitude prevents the infection.

Again, in spite of the cold, in higher altitudes the condition occurs fairly frequently. Jebel Jehaf plateau, where most cases were found, is over 7000 feet above sea level.

It is suggested:-

1. That in any propaganda campaign and in the training of health orderlies the dangers of urinating and defaecating near water supplies and especially into irrigation channels and running streams be stressed.
2. That people be taught to keep these channels and streams free from weeds.
3. That as opportunity offers a complete collection of the snails of each district be made and the snails identified.
4. That fuller data be collected of the cases occurring in each area.
5. That when these data are obtained, or before if possible, the services of an expert be engaged and his advice taken as to the best anti-bilharzial measures to be adopted.

4. SMALLPOX

Smallpox has visited South Arabia in periodic epidemics several times within the memory of the people, and there have been many deaths. As a cause of blindness in South Arabia smallpox is second only to trachoma.

In the winter of 1942 - 43 smallpox occurring in the Yemen caused anxiety to Protectorate border territory and cases were being reported from the Wadi Ma'adin area. On investigation it was found that the cases occurring within the Protectorate were in fact cases of varioloid. A local man had gone to a village within the Yemen where there were known cases of smallpox and had collected pus from the lesions. Conveying the pus in a disused cartridge case, he returned to his district and proceeded for a fee of one anna per person to vaccinate the community.

The following table gives an idea of the degree of protection against smallpox existing in the areas surveyed:-

	Vaccinated M.	Vaccinated F.	Not Vaccinated M.	Not Vaccinated F.	Had Smallpox M.	Had Smallpox F.		Remarks
Shugra	3		52				5%	Protection
Ayen	10		55		7		24%	"
Haski	17	3	43	24	6	11	35%	"
	20		67		17			
El What	30	2	63	8	36	14	50%	"
	32		71		50			
Tor am Baha	26	1	112	4	39	10	39%	"
	27		116		49			
Khor Umeira	18		63	29	6		20%	"
			92					
Muscimir	24		134		31		29%	"
Kirsh	24		72	16	38	2	42%	"
			88					
El Milah	7	0	24	9	5	2	30%	"
	7		33		7			
Jebel Jahef	27		135	25	26	2	26%	"
			160		28			
Dhubeeyat	14		40		26		50%	"
Soldiers Tor am Baha	15				12		100%	"
El Milah	7		2		1		80%	"

RECOMMENDATIONS

Since no trained vaccinators are at work in the Western Aden Protectorate it must be assumed that most of the vaccinated men and women were done when proceeding into Aden Colony: a few are known to have been done directly from cases of smallpox by the "bedouin method". This is especially so at Tor am Baha.

In villages which are close to areas where vaccinators are working a few women have been done e.g. El Waht and Haski.

It is clear that the people do not object to vaccination and if vaccinators were available a large proportion of the population, probably including the women, would be done.

In the Beihan area the Sultan had one of his men trained as a vaccinator and it is suggested that all the Tribal Health Orderlies be trained to vaccinate, and that regular campaigns of vaccination be undertaken every few years or as is found most practicable.

5. SKIN CONDITIONS

If the occurrence of skin conditions in a population is the "outward expression of inner dissatisfaction" then the inner dissatisfaction in South Arabia is profound: 286 cases or 18% of all the people examined had some form of skin trouble.

From the following notes a very strong case emerges for believing that the greater part of this skin trouble is the result of dietetic deficiency.

Yemen Ulcer - This local form of tropical ulcer is a very common cause of disability and was met with 43 times and occurred in all but two areas. The usual site of a Yemen ulcer is in the ankle region and factors in its production may include trauma, dirt and lack of care. Various specific organisms have been blamed as causal but the main factor is probably nutritional. This is borne out by the frequent occurrence of these ulcers in a part of the body which is least able to take rest and which has a poor blood supply - and in people who are undernourished and over-worked - e.g. the road workers of El Milah and the farm labourers of Tor am Baha and Jebel Jehaf.

Some workers have found that treatment with vitamin C has been helpful, while others have thought the condition to be due to a lack of vitamin B. In March 1935 BUCHANAN and SANDERSON published an article on this condition in the Transactions of the Royal Society of Tropical Medicine and Hygiene (Vol. XXVIII No.5, page 506). They found that these ulcer cases occurred mainly in those existing on a minimum diet scale, many of them had the dry crinkly skin of under-nourishment.

Septic Spots - It is thought that the rather indefinite condition referred to under this head is also an expression of lowered vitality and that it is probably nutritional in origin; 66 cases were met with and it occurred in every area visited except El Milah.

While lack of cleanliness is an important cause of septic conditions of the skin, the absence of adequate protective factors, and especially of Vitamin A, is the cause of the lowered resistance which allows the dirt organisms to establish themselves.

Phrynoderma and associated conditions - These conditions accounted for 28 of the cases seen but most of them occurred in the Muscimir (10) and Jebel Jehaf (15) districts.

"Bahaq" and "Bashash" - These two conditions claimed 62 of the 286 skin cases. "Bahaq" is the local name for a condition of roughness and dryness of the skin, especially of the face and chest. The skin peels off in small flakes and exposes an area lighter in colour than the surrounding skin. These areas of hypopigmentation draw attention to the condition and sometimes the patient asks to be assured that his condition is bahaq and not leprosy.

"Bashash" is probably just a form of bahaq. It is usually confined to the face. As in bahaq the affected skin is dry and rough but though it cracks into small flakes these remain attached and the area looks very finely powdered.

It was natural to associate these conditions with nutritional defects: either with phrynoderma or with pellagra-like eruptions with "a tendency to peel and expose small areas of a lighter colour". (Tropical Nutrition, Nicholls, 1938, page 127) but Dr. MERUCCI of the Italian Mission to Yemen stationed in Hodeidah has done some work on bahaq and says that it is an infection with Microsporon minutissimum - an erythrasma.

"Blue Skin Disease" - This definite clinical entity is one to which one hesitates to give any recognised name. It was called "Blue skin disease" by the late Dr. John C. YOUNG of the Mission Hospital at Sheikh Othman and we cannot better the title. The Arabs call it "Sauda" a name suggesting a black rather than a blue colouration of the skin.

Only 3 cases were seen in this series but the condition is commoner in hospital practice and from up-country patients than this would lead one to suppose.

The skin in the regions affected becomes blue-black. It occurs most often on the legs, especially the shin and the inner side of the thigh. It is frequently symmetrically bilateral. The affected skin is very itchy and is slightly scaly, rough and thickened. An outstanding feature is the enlargement of the groin glands. Arab sufferers usually insist that these glands are the main seat of the disease and come asking that this "um" - mother or origin - be removed. The Bedouin treatment for the condition is to bite these glands through the skin so that they are broken into small masses.

It was at one time customary to remove these glands as the treatment. They were found to be of a rubbery consistence and gelatinous appearance. Frequently they extended down into the femoral canal. Nothing of special interest was reported on microscopic examination. The operation wound healed slowly, had rolled edges and oozed a colourless serum. The improvement in the condition was perhaps due to the prolonged rest in bed and hospitalisation, with cleanliness and good food, as much as to the operation.

An Australian dermatologist passing through Aden was asked his opinion on one of these cases shown to him at the Mission Hospital; and he thought it to be a form of sporotrichosis.

On the other hand Drs. AFFARA and SMITH (1941) working at the same hospital, claim to have found microfilariae in the blood of these patients.

Summary of Skin Conditions

The following tables gives a summary of the skin cases seen:-

	Yemen ulcer	Bahaq & Bashash	Favus capitis	Acne vulgaris	Impetigo	Scabies	Blue skin	Verruca vulgaris	Ringworm Infections	Leucoderma	Septic spots	Phrynoderma & conditions prob. associated with vitamin deficiency	Miscellaneous conditions
Shaqra	2	2	1	-	-	-	-	-	-	-	6	0	1
Lahyen	3	3	-	-	-	-	-	-	-	-	2	-	1
Yafa'i	3	2	-	2	1	-	-	1	2	-	13	-	-
El Wahat	-	1	-	1	2	-	-	-	1	-	3	1	1
Tor am Baha	7	13	-	1	-	9	1	-	1x	1	7	-	1
Khor 'Umeira	-	2	-	2	-	-	-	2	-	1	2	1	1
Muscimir	6	8	1	1	1	4	2	-	1	-	16	10	1
Kirsh	3	2	-	2	-	-	-	1	-	-	8	-	-
El Milah	6	8	-	3	1	-	-	-	-	-	-	-	3
Jebel Jehaf	8	13	9	1	-	12	-	-	4	-	8	15	1
Dhubiyat	5	8	1	1	-	-	-	1	2	-	1	1	1

x Tinea Barbae.

Miscellaneous conditions include isolated cases of urticaria, pigmented naevi, seborrhoea and undiagnosed conditions.

RECOMMENDATIONS

Of the four main conditions, septic spots (66), bahaq (62), Yemen ulcer (43) and phrynoderma (28), three are probably and one possibly, due to dietetic deficiency.

Of the 83 cases not included under these heads 54, made up by favus, impetigo, scabies and ringworm, are dirt diseases.

The recommendations are therefore to raise the standard of nutrition and cleanliness through out the whole area. Fuller notes on nutritional recommendations are given under that heading. The importance of personal cleanliness should be stressed in all health campaigns and should have a place in the hygiene syllabus at the School for the Sons of Chiefs.

6. EYE CONDITIONS

About 8% of all patients attending for treatment at the various out-patient centres in Aden come to have some form of eye disease treated. This in itself would have made it reasonable to devote a special section of our Survey Card (see Appendix I) to diseases of the eye, but in addition to this it has been shown that there is every reason to consider trachoma as one of the major scourges of South Arabia.

An examination of the eyes of 100 unselected schoolboys in Aden revealed 70 suffering from trachoma. An examination of some 600 schoolboys in San'a showed that the incidence among them was over 80%. The trachoma incidence in Hodeidah and other towns of Yemen, both on the coast and in the mountains, is high, and therefore special attention was given during this survey to trachoma.

The first of the two tables below sets out the findings on trachoma and the next deals with the other diseases of the eye met with and takes special cognizance of loss of vision.

TRACHOMA - The terminology used in this report is that developed by Mac. Callan to differentiate the stages of the disease:-

Briefly Tr I is the stage of invasion.
Tr. I[I] is the stage of complication and progress.
Tr. III is the stage of regression and scar tissue formation.
Tr. IV is the burnt-out condition left after the complete replacement of the normal conjunctiva by scar tissue.

TRACHOMA INFECTION IN ADEN PROTECTORATE

Place		Tr.I	Tr.II	Tr.III	Tr.IV	Total of earlier Columns	Overall	Comment
Shuqra	under 15	77%	11%	0%	0%	88%	75%	This is high because so many of those seen in Shuqra were schoolboys
	over 15	11%	0%	0%	0%	11%		
Abyen	under 15	22%	37%	0%	0%	50%	47%	Here also more children were seen than adults by 2/1.
	over 15	17%	4%	0%	0%	21%		
Haski	under 15	45%	13%	11%	0%	69%	49%	
	over 15	11%	4%	11%	8%	34%		
El Waht	under 15	30%	23%	15%	4%	72%	62%	
	over 15	7%	2%	16%	23%	48%		
Tor am Baha	under 15	43%	5%	0%	0%	48%	37%	
	over 15	11%	2%	11%	7%	31%		
Khor 'Umeira	under 15	31%	0%	4%	0%	35%	26%	No cases of the most infective stage Tr.II.
	over 15	14%	0%	5%	3%	22%		
Museimir	under 15	36%	4%	4%	0%	44%	36%	
	over 15	16%	1%	5%	8%	30%		
Kirsh	under 15	10%	0%	0%	0%	10%	13%	No. cases of Tr. II.
	over 15	12%	0%	0%	0%	14%		
El-Milah	under 15	27%	0%	0%	0%	27%	14%	-do-
	over 15	8%	0%	0%	0%	8%		
Jebel Jehaf Arab	under 15	30%	5%	0%	0%	35%	25%	Average on Jebal Jehaf 27%
	over 15	9%	1%	4%	0%	14%		
Jebel Jehaf Jews	under 15	31%	12%	6%	0%	49%	40%	
	over 15	0%	0%	0%	0%	0%		
Dhubiyat	under 15	30%	0%	4%	0%	34%	14%	No. cases of Tr. II.
	over 15	0%	0%	2%	0%	2%		

NOTES ON TRACHOMA TABLE

1. Trachoma occurs throughout the surveyed area but its incidence is much higher in the Fadhli and Abdali areas (Shuqra, Abyen, Haski and El Waht) than elsewhere. While it is true that in the Fadhli areas (Shuqra and Abyen) more children were seen than adults and this would tend to raise the overall percentage, the areas mentioned show their high incidence of trachoma in the figures for children only, as well as in the overall percentage when compared with the other areas.

2. In every case but one (Kirsh) the under 15 total percentage is higher than the over 15 total percentage. The under 15 incidence is even more markedly higher in the earlier stages I and II. The more advanced stages, III and IV, naturally tend to be commoner in the age groups over 15. The figures tend to strengthen ones belief that trachoma is, in many cases a self curing disease.

3. The Jebel Jehaf figures lend colour to the idea that Jews are more prone to trachoma than other races.

4. In all areas of low incidence the florid Tr. II stage was absent (Khor 'Umeira, Kirsh, El Milah and Dhubiyat). It was in this series that in one case (Kirsh) the total incidence among adults was higher than that among children.

OTHER EYE CONDITIONS - In the following table the "Senile Cataract incidence" is expressed as a fraction of the number of individuals seen in the "over 45" group. Thus in Haski 13 people in the "over 45" group were seen and 4 had senile cataract so the "senile cataract incidence" for Haski is given as 4/13.

If this senile cataract incidence is expressed as a percentage it will be seen that the average senile cataract incidence for the whole area is 33 and, except at Dhubiyat where no cases of cataract were seen, it is everywhere over 10.

"Partial blindness" is here used to mean that the vision is reduced in at least one eye so that the individual cannot count fingers at a distance of six metres. The column giving the figures for "partial blindness" takes into consideration only the over 15 group and the incidence of "partial blindness" is expressed as a fraction of those seen. Thus in Tor am Baha 107 people were seen in the over 15 groups and of these 11 were "partially blind" so the incidence of "partial blindness" is given as 11/107. The average incidence of partial blindness over 15 is 11% for the whole area. The figures for "night blindness" are not included here, but under the section on nutrition.

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EYE CONDITIONS OTHER THAN TRACHOMA

Place	Senile cataract incidence	Monocular blindness including glaucoma and traumatic cataract	Corneal opacity	Corneal ulcer	Partial blindness	Conjunctivitis	Squint	Other conditions (not including night blindness)	Comments
Shuqra	1/1	1	0	0	1/15	0	1	(a) Pigmented Sclera 1	
Abyen	3/3	3	0	0	7/34	11	0	Blepharitis 2	
Haski	4/13	1	2	2	7/66	2	1	Pterygium 1 Ephiphora 1 Pinguecula 1	
El Waht	11/23	1	9	0	21/67	8	0	Blepharitis 3 Ephiphora 1 Pterygium 1	El Waht, 34% of the adult population have markedly reduced vision in at least one eye.
Tor an Baha	7/15	1	4	0	11/107	4	4		
Khor 'Umeira	10/18	0	2	2	14/68	0	0	Unexplained poor vision 1 "Corneal blisters" 3	
Muscimir	2/15	1	2	0	5/109	4	0	Tarsal cysts 2 Chalky deposits in sclerae 1 Senile ectropion 1	
Kirsh	2/16	2	3	0	7/97	1	0	Pterygium 1	
El Milah	1/8	1	0	0	2/27	1	0	Chalky deposits in cornea 1	
Jebel Jehaf	3/20	2	0	1	6/116	3	1	Blepharitis 1 Conical cornea 1 Ephiphora 1	
Dhubiyat	0/10	0	0	0	0/45	4	1	Blepharitis 1 Pterygium 1	

NOTES ON TABLE OF EYE CONDITIONS OTHER THAN TRACHOMA

1. With the exception of Khor 'Umeira the areas with a low trachoma incidence (Kirsh, El Milah, Jebel Jehaf and Dhubiyat) have less blindness than the other areas.

2. At Khor 'Umeira cataract (60%) and partial blindness (20%) are unexpectedly common. Nutritional factors may play a part in the production of corneal blisters and the glare at the sea side may play an added part in the causation of cataract.

3. The incidence of entropion and other late signs of trachoma is unexpectedly low, but many of the cases of corneal damage are due to trachoma.

RECOMMENDATIONS

The widespread incidence of trachoma in so many countries of the East and especially the Near East might make it worth while considering the inclusion of instruction on that condition in courses for diplomas in tropical medicine. In any case the attention of medical workers in South Arabia should be drawn to the importance of the condition. In recent years some six cases in Europeans have come to the notice of one of us.

An anti-trachoma campaign requires a carefully trained staff and a fairly elaborate follow up organisation but as the Protectorate medical schemes develop this need should be borne in mind. Meanwhile something can be done to lessen the incidence of the disease by recognition of its infective nature, improvement in ventilation, avoidance of overcrowding and instruction in general cleanliness.

Smallpox and nutritional defects may be held responsible for some of the cases of blindness, so that any steps taken to reduce the incidence of blindness should include the widespread vaccination of the people and the raising of their nutritional standard.

7. OTHER MORBID CONDITIONS

Special paragraphs have been devoted to malaria, bilharziasis, eye conditions and skin conditions, but many other diseases were met with in the course of the survey and it would be too tedious to go into detail on them all.

The following table summarises those conditions not yet reported on in the earlier paragraphs and in the notes following the table some of the outstanding conditions are more fully discussed:-

OTHER MARBID CONDITIONS

This table does not include malaria, bilharziasis and other conditions discussed in separate sections of the report.

	Shugra	Abyen	Hasid	El Waht	Tor am Baha	Khor 'Umeira	Mausimir Kirah	El illah	Jebel Jehaf	Dhubiyat	Total
Chicken pox				5		1	1				7
Whooping cough ①					2			1	2		5
Dysentery			1	7	1		4				13
Pyretoma	1					1					2
Anterior poliomyelitis					2		1				3
Gonorrhoea	3										3
Syphilis					2	1					3
Bejel ⑤		1*				2	1				4 *Juxta - Articular nodes.
Pulmonary tuberculosis	2	3	4	4	6		1		1		21
Non pulmonary tuberculosis			0	2							3
Leprosy ⑦		2	4				1	3			10
Circulatory diseases ②		2	5	4	6	1	4	1	2		26
Respiratory " ④		5	10	8	19	14	20	28	66	33	227
Nervous "			13	1	2	3		24	43	25	13 ⑥ of which 6 marked were Epilepsy.
Rheumatic "	1	2	5	11	11	14	16	7	2	1	74 Neuritis, fibrositis and joint pains.
Intestinal		3	2	15	2	6			2		32 Mostly constipation.
Diseases of the stomach			6	3	8	5	9	2	5	5	47 Mostly dyspepsia.
Diseases of the ear ③			3	6	6	7	4	1	7	2	38
Worm infections not bilharziasis			1			0	0	2	3	1	1 Hydated 5 Ascaris 7 1 Filariasis
Congenital abnormalities		3				1	2				8 Includes 4 ventoral hernias.
Inflammatory conditions			1			4	1			1	7
New growths			1		2	2	2	2	1	1	12 6 Lipoma 3 Dermoids
Injuries			2	2	3	1	7	1	1		17 1 Snake bite 1 Euphorbia burn

1. Since the survey was completed an outbreak of whooping cough on the Dhala' plateau has been reported.

2. Haemic murmurs accounted for many of these cases especially in areas where malaria is hyperendemic e.g. Haski and Tor am Baha. Anaemia is a constant condition throughout the area surveyed. One patient with cardiac insufficiency gave a history suggestive of acute rheumatism.

3. Otitis media was found in 26 of 340 children under 10, an incidence of eight per cent. In El Waht and Khor 'Umeira the incidence under 10 was over fifteen per cent. whereas in Kirsh and the Fadhli areas no cases were seen.

4. Bronchitis and the common cold make up the bulk of the figures under this head but "chronic cough" was also frequent and is referred to again in note 6 below. Nearly every village visited had one or more cases of asthma. There was one case of acute lobar pneumonia.

5. Bejel. The condition described as bejel was mentioned as long ago as 1931 when HUDSON and YOUNG from Deir ez Zor on the Euphrates wrote "syphilis among the Bedouins and Moslem townspeople is not a venereal disease; it is acquired either congenitally or early in life, manifests itself in lesions which, though disfiguring are not incapacitating, and is so common that especially among the Bedouins it is taken as a matter of course the disease in fact can hardly be called syphilis without qualifying adjectives. It agrees in few points with the disease called syphilis in occidental medicine and has interesting similarities to that other treponematosis, Yaws".

Some years later, Dr. R. NAPIER then of Sheikh Othman, in a letter to the British Medical Journal, drew attention to a similar condition in South Arabia. Many of his cases came from the Zabeed district of Yemen and he called the condition "Zaboody syphilis".

One of us has seen a number of these cases in Sanâ. They came from certain definite districts of which Zabeed is one. Others are Medinat el 'Abeed, Jowf, Ma'arib and, recently, there has been a series of cases sent across by the Political Officer from the Beihen district of the Western Aden Protectorate.

In summer 1942 Dr. MA' ALDON or RASHID visited Sanâ and one of us had the opportunity of discussing these cases with him. Dr. Rashid is in charge of the Netherlands medical work in Mecca, his home is in the Netherlands Indies and he is of opinion that the bejel we see in Arabia and the yaws he sees in his own country are one and the same disease. Certainly the usually accepted forms - goundou, gangosa and juxta-articular nodes, have all been met with in the Protectorate.

The condition was less frequently met with during the survey than was expected, but we did not visit Beihan, the area from which most of the Protectorate cases have so far come.

6. Pulmonary Tuberculosis:- The occurrence of 21 cases (about 14 per 1000) in a superficial survey of this nature indicates an unexpectedly high incidence of the disease. It is to be borne in mind that nearly all the cases discovered were males because of the difficulty in getting women to allow examination of their chests. Again, among the 'Respiratory Conditions' here listed there are a number of cases of chronic cough, some of which are almost certainly pulmonary tuberculosis.

In a country where there are hours of bright sunshine every day in the year, this state of affairs aught not to be. Nutritional factors and general poverty may play a causative part in some cases but since the survey the Sultan of Mausimir has died of the disease and the Amir Haidera of Jebel Jehaf has been under treatment for the same condition - both are rich men with plenty of available food. I consider the following factors to be contributory causes of the high incidence of pulmonary tuberculosis in the area surveyed:-

(1) Small, very poorly ventilated and overcrowded sleeping rooms.
(2) Insanitary habits, especially promiscuous spitting.
(3) Qat parties held in crowded rooms. The ritual of the qat party demands that the doors and windows be closed so that the participant can "get up a good sweat", the frequent and vigourous expectoration of chewed qat leaf into cuspidors, and the communal use of hubble-bubble pipes with wooden mouth-pieces.
(4) Nutritional factors, in the poorer people because of real lack and in the others because of ignorance.

(5) The confined conditions of the harem, especially in the more important families. This means that all the adult women and all the young children who spend their time with them live in semi darkness when indoors, and the women are closely veiled when out - which is infrequently.

7. Leprosy. The occurence of leprosy in South Arabia has long been known but most of the cases coming to Aden for treatment are from Yemen, and the belief was optimistically current that there was very little leprosy in the Protectorate. Some half dozen cases had been reported from areas in the Protectorate as widely separated as Hadhramaut, Dhala', Lahej and Abyen.

The occurence of ten cases (7/1000) in the present survey suggests a higher incidence of the disease than was supposed. The most considerable nidas seems to be in the Lahej district and as this is so near Aden it both could be and deserves to be more fully investigated.

The cases seen included cutaneous, nervous and mixed types. The impression gathered, before the survey commenced, that the dark people (e.g. from Abyen) usually have nodular disease while the purer Arabs usually have the nervous type was strengthened by this series.

Leprosy is of course, known to the Arabs and is sometimes correctly diagnosed by them, but other diseases, especially leucoderma, are sometimes erroneously called leprosy. We found no evidence that the sufferers from this disease had any grave social disability forced upon them by their neighbours. In one case an adult woman had remained unmarried, presumably because of her leprosy, but others - both men and women - had married and had had children. One of the men was a qat seller, and all seemed to go about their daily work in a normal way.

Before the outbreak of the present war the Keith Falconer Mission of the Church of Scotland at Sheikh Othman ran a leprosarium which was financed by the Aden Government. To this all lepers in the Colony, usually beggers, were sent.

In 1940 this was closed and the building prepared for use as an emergency hospital. Present opinion in Aden seems to be against the Aden Leper Hospital being opened again, partly because the modern trend of thought seems to be against the segregation of all lepers and partly because it seems unwise to attract a number of lepers from Yemen and elsewhere to the Colony. At the same time the difficulty of keeping lepers out of Aden markets may lead to some steps being taken to house them. Perhaps any future leper hospital should be outside the Colony.

To make the list of morbid conditions as complete as possible the following diseases are mentioned; they were not met with during the survey but have been reported by other workers in South Arabia:-

Hookworm - Dr. P. P. MURPHY has reported several cases of Necator americanus infection from among the patients of the Civil Hospital. Some of these cases are from the Western Aden Protectorate.

Guineaworm - Cases from the Western Aden Protectorate have quite frequently been treated both at the Civil Hospital and at the Mission Hospital.

Oriental sore - Several cases have been reported. Col. E. S. PHIPSON had one case, in a European, which he believed to have been contracted in the Colony of Aden.

Kala azar - Cases have been reported from Yemen and Hadhramaut by Dr. P. P. MURPHY.

Typhus and relapsing fever - Both these conditions are common in the mountains of Yemen; both are louse-borne.

Sleeping sickness - It may be appropriate here to repeat that no evidence of this disease was found and that neither during this survey, nor during the recent entomological expedition lead by Dr. Hugh SCOTT of the British Museum, were any tsetse flies found. Both parties visited the area mentioned by CARTER, (Brit. Med. J. 1906, Volume 2. p.1393) as having been infested with Glossina tachinoides, and were on the look out for them.

8. VITAL STATISTICS

On a survey such as this, and in a moslem country such as South Arabia, data for the compilation of vital statistics are hard to come by.

The only statistics of this nature gathered by us concern marriage fertility infant mortality and child mortality under 5. This last was included because on our visit to Haski so many of the mothers told us of children born to them alive who had died in the first few years of life.

Our definition of "an infant" during the survey was "a baby not able to walk and still on the breast". Admittedly this is not accurate but it was readily understood by the mothers.

The main table is Table I, for it is based on data supplied by women in the 15-45 group, but Table II, based on data from older women, is included to give as full a picture as possible.

For comparative purposes it may be of interest to note that over a period of years the infant mortality of Aden Colony has never exceeded 225 nor been less than 160.

These figures concern only the Marriage Rate among women: the Fertility Rates and the Infant and Child (under 5) Mortality rates.

TABLE No. 1

Place	Women seen 15 - 45	Marriage rate	No. of children born alive	Fertility Rate and Married Fertility rate	Infant Mortality per 1000	Child Mortality under 5 per 1000
Shuqra	1	1/1 = 100%	6	6. 6.	0	0
Abyen	6	5/6 = 83%	30	5.6. 6.0	7/30 = 233	17/30 = 566
Haski	17(a)	11/17 = 65%	43	2.5 3.9	9/43 = 210	23/43 = 535
El Waht	9(b)	7/9 = 78%	33	3.7 4.7	9/33 = 273	13/33 = 394
Tor-am Baha	5	100%	19	3.8 3.8	7/19 = 368	7/19 = 368
Khor 'Umeira	11(c)	100%	60	5.4.	10/60 = 166	19/60 = 233
Wadi-Timnan	3	100%	20	6.6	6/20 = 300	6/20 = 300
Museimir	4(d)	100%	14	3.5	5/14 = 357	5/14 = 357
Kirsh	7(e)	6/7 = 87%	23	3.3 3.9	5/23 = 217	6/23 = 261
El-Milah	2(f)	100%	4	2.0	1/4 = 250	1/4 = 250
Jebel Arab	5(g)	100%	19	3.8	10/19 = 526	10/19 = 526
Jebel Jehaf Jew	4	100%	27	6.75	8/27 = 296	8/27 = 296
Dhubiyat	2	100%	12	6.0	1/12 = 83	1/12 = 83
Over all figures	76	66/76 = 87%	310	4.1 4.7	78/310 = 245	111/310 = 358

a. One of those who had been married was divorced at the time of the survey.
b. Two of the married women were childless after 10 and 12 years of marriage respectively.
c. One of the married women was childless.
d. One was a widow after 8 years marriage.
e. Two were divorced and the unmarried woman was a leper.
f. One divorced.
g. One widow.

Those figures concern only the Marriage Rate among women: the Fertility Rates and the Infant and Child (under 5) Mortality Rates.

TABLE No. 2

Place	Women seen over 45	Marriage rate	No. of children born alive	Fertility rate and Married Fertility rate	Infant Mortality per 1000	Child Mortality under per 1000
Shuqra	-	-	-	-	-	-
Abyen	-	-	-	-	-	-
Haski	9(a)	8/9 - 89	53	5.9 6.6	9/53 - 170	34/53 - 661
El Waht	7(b)	6/7 - 86	34	4.9 5.7	2/34 - 59	11/34 - 324
Tor an Baha	6(c)	100%	24(d)	4.0 4.0	4/10 - 400	5/10 - 500
Khor 'Umeira	6(e)	100%	45	7.5 7.5	7/45 - 155	8/45 - 178
Wadi-Tiumrr	-	-	-	-	-	-
Muscinir	-	-	-	-	-	-
Kiwsh	3	100%	14	4.7 4.7	4/14 - 286	5/14 - 357
El-Hilah	5(f)	100%	26	5.2 5.2	7/26 - 269	9/26 - 346
Jebel Arab Jehaf Jew	3(g)	100%	16	5.3 5.3	7/16 - 437	11/16 - 687
Dhibiyat	-	-	-	1	-	-
Over all figures	39	37/39 - 95%	212	5.4 5.7	40/212 - 189	93/212 - 439

a. One widow.
b. Two widows. The women over 45 in E. Waht had had an average married life of 27 years some of them with as many as 4 husbands.
c. Two widows.
d. One of these women had had 14 children but was so hazy about dates of death of the 12 who had died that her figures are omitted from the I.M. and C.M. rates
e. One widow.
f. One widow.
g. Three widows.

The marriage rate and fertility rates are high throughout the area. Few of the women were childless and most had been married two or more times. Divorce is common and for younger women the period between divorce and remarriage is usually of short duration.

The Infant Mortality rate is high throughout the whole area but is specially high on Jebel Jehaf. The Jehaf plateau should be a healthy area but nutrition is very poor in relation to soil fertility ("an agricultural slum" B. J. Hartley). Muscimir and Tor an Baha also have very high readings and in both malaria is hyperendemic.

In Khor 'Umeira, where there is no malaria, reasonably good feeding, and where the women have almost as much freedom to be out and about as the men, the Infant Mortality is lower than in any other area at which more than one or two women were interviewed.

The Child Mortality under 5 is more than double the Infant Mortality in two areas, Abyen and Haski. In both these areas the deaths among young children are probably frequently due to malaria.

It is suggested that the main casual factors of the many deaths among infants and young children are malnutrition of the mothers, malaria and ignorance of child welfare. Only in one area, El Waht, did infant diarrhoea seem to play an important part.

Suggestions regarding malaria and malnutrition are made in the sections on malaria and nutrition respectively.

As plans for health propaganda in the Western Aden Protectorate are developed an important place will be taken by teaching on Maternity and Child Welfare and it may gradually be found possible to train women midwives and district visitors, as has been done in Khartoum and elsewhere.

Meanwhile a good grounding in these subjects should be given to the Tribal Health Orderlies and the main principles of Child Welfare should be included in the propaganda talks of the Medical Officer.

9. SANITATION

Dry Refuse

Rubbish dumps are a marked feature of the villages in every district we visited except Khor 'Umeira. Sometimes these are disposed around the village as at Haski, sometimes they are scattered quite irregularly about the village as in El Waht, and where the village is built upon a hilltop or on the side of a rock the rubbish is usually tipped over the edge and accumulates in dumps there, as at Muscimir.

In a few cases regular and fairly thorough burning of the rubbish heaps takes place, as in Haski and Wadi Natid. In other places erratic attempts are made, as at El Waht, but in most places no attempt at all is made to destroy the great heaps of accumulated rubbish.

As practised, the burning of the dumps is not always a successful undertaking At Haski the dumps of powdered ash are higher than the houses and are very close to them. A soft powdery dust blows about in the least wind and is very objectionable. People walking on the dumps have had their feet burned by sinking through the soft powdery innocent looking top layer into the smouldering rubbish below.

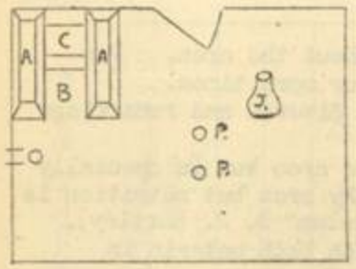
In Wadi Hidaba the incineration is more efficiently done; the dumps are farther from the village, they are more spread out, not so high, and care is taken to separate the soiled straw from the dung so that the dry soiled straw burns well.

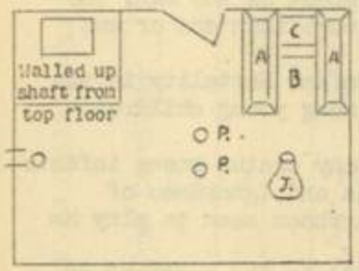
The dung heaps are later used for manure or for making into dung cakes, which form a useful household fuel.

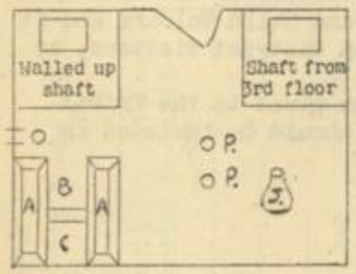
Human excreta

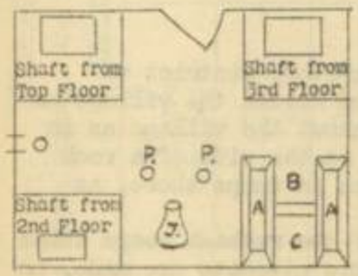
The lack of provision of any latrine accommodation is one of the most striking features of the great majority of the houses in this whole area.

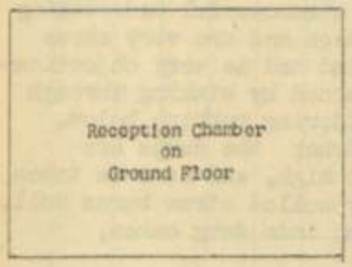
In the mudbrick houses of Shuqra and El Waht the "long drop" system was found. This system is worth describing at some length as some modification of it might merit wide use in the Protectorate.











The "longdrop" system is in use in various forms throughout the whole of South Arabia i.e. in Yemen, Hadhramaut and the Western Protectorate. In certain towns it is almost universal in houses of two storeys or over and even in one-storey mud brick houses it is to be found as at El-Waht.

The system consists in setting aside one room on the ground floor for the reception of faeces and building the lavatories on each floor so that they are over this reception chamber. The shaft from the squatting place of each lavatory is walled off as it goes down so that on each floor the lavatory is that much smaller than the lavatory on the floor above.

The latrine accommodation of a four storey house is shown in the accompanying diagram.

The squatting place in each lavatory consists of two rectangular stones (A and A) these are raised some six inches from the general floor level and separated from one another by about nine inches. The front part of the space between these stones is sloped and bricked up (B) so that the urine is led to the drainpipe outlet (O) and so down the gutter on the face of the house. Behind this is the upper opening of the shaft (C) down which the faeces fall to the reception chamber on the ground floor.

In better class houses the lavatory is also provided with other two raised pedestals (P) and a jar of washing water (J). The pedestals are for standing on while taking a bath by splashing oneself with water from the jar. The jar is usually provided with a lid on which a tin is placed. This tin is used to scoop out the water as required and pour it over oneself.

The floor of the lavatory is sloped from these pedestals and from the squatting place to the outlet drain pipe (O).

The "reception chambers" in Shuqra were said to be cleaned out twice a year, but in El Waht some were never cleaned out, and in both places the "reception chamber" was inadequately bricked up.

There seems to be no realisation anywhere in the area of the dangers of human excreta. Even in El Waht, where we were dealing with relatively educated people, we had the example of a patient with dysentery who emptied his bowels by his bedside in one of the nicest rooms in the village - the faeces were then sprinkled with sand and ashes and allowed to dry into the floor.

In brushwood houses the people usually have no latrine but go out to any convenient "cover" - for example the centre of the corn sheaves in Haski - but in some places, as Shuqra, a corner of the courtyard is screened off for a latrine. Such screened off corners are frequently in dangerous proximity to the kitchen and the drinking water.

In other areas such a corner is used only in sickness or emergency. Special arrangements for the recurring emergency of tribal warfare are made in Tor an baha, Huseimir and Kirsh where a projecting alcove

Mud brick house in Shuqra showing
a. gutter on face of house
b. entrance to "reception chamber"

in an upper storey is used but even this is intended only as a urinal and the act of defaecation is postponed till the hours of darkness make it safe to slip out of the house to the shelter of some nearby rock or bush.

The specially built roof channels seen at Huseimir and on Jebel Jehaf were, probably, originally for war emergency purposes. The Huseimir channels were used only as urinals but those at Jebel Jehaf were used for solids also, and later the accumulated faeces were used to plaster the outer parts of the roof.

It should be noted that hookworm has recently been reported from the Lahej and other areas by Dr. P. P. MURPHY, Acting Civil Surgeon, Aden.

Public Conveniences

Every mosque has a urinal and ablution pool attached to it. Sometimes these places are used for defaecation as well though this is against the Moslem Code. The ablution pools are often very near and are obviously contaminated by the urinals. The ablutions for prayer include rinsing out the mouth. The ablution pools are frequently found to be swarming with mosquito larvae.

Markets etc.

There are no considerable meat markets in the area we visited but the fish markets in Haski and El Waht swarmed with flies. The storage boxes for smoked and salted fish in El Waht and at Shuqra are full of weevils and the store rooms are in an insanitary condition.

Recommendations

The clamant need in this field is for some satisfactory means of disposing of human excreta, but before dealing with this outstanding problem a few remarks may be made on the lesser ones e.g. dry refuse disposal, market sanitation and mosques.

Dry refuse. The dust from the rubbish heaps is a continual nuisance, and during or just after wet weather, is a danger. These dumps are breeding grounds for flies and probably harbour rats. The only attempt so far made by the people themselves to dispose of these heaps is by burning, and until more elaborate methods become practicable, this method as adopted in Wadi Hidaba seems most suited to the country.

Thus: (i) All rubbish heaps should be fifty yards or more from the nearest house wherever possible, and always in smaller villages they should be limited to the periphery.

(ii) The people should learn to separate cattle dung from the soiled straw which, in all areas, makes the great bulk of the rubbish.

(iii) The dung heaps should be used for manuring the fields or made into cakes for fuel.

(iv) The rubbish heaps of soiled straw should be burned once a month, and at regular intervals the ash should be strewn on the fields so that no rubbish heap should ever be more than 6 feet high.

These recommendations and the others which follow will require the education of the people; a matter to be dealt with more fully later.

Market Sanitation. In all places where there is a considerable market the local ruler should be encouraged to appoint a market overseer - or to add the inspection of markets to the duties of his "health orderlies". These officials would then instruct stall holders in the disposal of this refuse and the decent care of their stalls. In fish markets, and in places where fish is stored, special instruction would be required.

Mosques. The co-operation of caretakers of shrines and local imams of mosques should be encouraged. The rule that urinals must not be used for defaecation should be enforced, for in this matter we have Moslem Law on our side. Ablution pools should be emptied regularly and refilled with fresh, clean water. Where this is for the present impossible they could be treated with Paris green if its repeated use could be proved not to be a danger to those who rinse out their mouths at the pool.

Disposal of Human Excreta. That improvements in this field are an urgent necessity needs no further argument. The points to discuss are how can improvements be attained and what form they should take.

(i) How is improvement to be attained?

Education must be our main weapon. This would include (a) the education of local rulers by personal talks from the Protectorate medical staff and other officers

who visit them, (b) the training of the "health orderlies" in sanitary methods applicable to their areas and (c) the education of the whole people by talks, by demonstration and by example.

Opportunities for training by example could be grasped more eagerly than they are at present. On various occasions during this survey we visited areas where Government representatives were living. Reports were submitted on these areas at the time and there is no need to repeat here what was then said but it may be reiterated that every British Officer and every collection of Arabs under British Officers should be so provided with proper sanitary arrangements that they become demonstration units to the people of the area. Wherever possible the methods used should be such that they will commend themselves to the people of the district and such as they could, without too much effort adopt for themselves.

(ii) What form should these improvements take?

(i) All faeces should be buried. This degree of progress has already been reached by the Israelites some thousands of years ago. In Deuteronomy XXIII, 12, 13 we read Moses's instructions on the subject" you must have a latrine outside the camp and go outside to it: you must carry a spade ... and when you relieve yourself outside you must dig a hole with it to cover up your filth". (Moffatt).

Moses presumably was dealing with a people not dis-similar to the tribesmen of South Arabia and what he set himself to achieve then may not unreasonably be the very least we can expect from the administrators of the Western Aden Protectorate today.

(ii) Some areas of the Protectorate are suited to bored-hole latrines, but in using these, precautions would need to be taken to see that the local well was far enough away and if possible "up stream" from the bore holes. The construction of bore holes and other practicable latrines would form part of the training of the health orderlies.

(iii) Pit latrines might suit other areas, and in each area some simple and satisfactory method should be worked out.

(iv) Where the "long drop" system is already in use it might be wise to accept it as the method of choice for that area at present, but modifications could easily be introduced which would make it a more satisfactory method. These would include closing up the "door" of the "reception chamber" to prevent the ingress of flies and the regular cleaning out of the "reception chamber".

(v) Finally public bodies and others in the Colony could help to train in healthy habits such of the Protectorate peoples as come into their employ as coolies etc.

10. HOUSING

Introduction

In a country in much of which the sun shines for twelve hours out of the twenty-four and for some three hundred days in the year, one would expect that all the evils associated with darkness and lack of sunshine would be absent. One would expect to find a healthy, open air people.

Unfortunately such is not the case: ignorance, laziness and in many places the unsettled state of the country combine to neutralise almost every advantage which nature has given them. The dwelling houses in most of the area surveyed vie with the worst slum dwellings of our great cities in overcrowding and squalor. But for the beneficent sterilising rays of the sun all the diseases attendant on such conditions must have decimated the people long ago.

Even amongst communities which have been settled for generations there is no attempt at village planning and houses are erected at the whim of the individual or allowed to go to ruin without any thought of public welfare. Live-stock in many places have the freedom of the house and in two storeyed houses occupy the lower floor.

The very fact of intertribal war might have compelled people to build their villages according to some plan of defence, but family feuds and personal quarrels claim more allegiance than the tribal chief, so that the single stone house, rather than the village, is the unit of defence. This is well seen, for example in the Tor ar Baha district, where communities are scattered in stone houses on the hill side rather than in compact villages, and in order to gain advantage over his neighbour - who is his potential enemy - a man erects his stone house as high as possible up the hillside so that he may overlook "offensive neighbours" and shoot down on them.

The houses

The type of house in a given district is dictated by various factors such as material available, degree of permanency desired and the need for defence. The idea that a house must also be a fort will become less dominant as the country becomes more settled, but education in the value of ventilation etc. will be needed even then to eradicate the wrong habits of house building, which generations of insecurity have enforced. The houses may be grouped for descriptive purposes under four main heads, matting houses, brushwood houses, stone houses and mud brick houses - no houses of burned brick were seen.

Matting Houses. These were the simplest dwellings seen and are mainly used by the nomadic people of the Subeihi coastal plain and their semi-settled relatives, for instance the fisher folk at Khor 'Umeira.

These "houses" should perhaps more properly be called "tents". They are rectangular in shape and consist of matting supported by corner posts. The winds along the sea coast are sometimes very strong, and great skill is shown by these people in securing their tents on the sandy ground in such conditions.

The tents are not much used during the day and are in fact only sleeping quarters, so that they are relatively more adequate than even larger houses where the women and children are kept inside. The women in this coastal area are unveiled and live a freer life, more nearly on an equal footing with the men, than in any other part we visited. The only furniture in these tents are rush mats and a few cushions. At night the few goats and chickens share the tent with their owners.

Brushwood houses. Various types of brushwood houses are to be found up and down the whole area and these are the houses most favoured by the poorest class in most areas. It is to be doubted whether such a house is really much cheaper to build than the single-roomed mud-brick or dry stone dwelling but presumably it is more quickly erected and easier to build.

In its commonest form the brushwood house has a framework of upright branches supporting roughly trimmed roof beams. Brushwood tied and woven together is fixed to the framework to form the walls and roof. In the best of these houses the walls are plastered inside with mud and the floors are plastered with mud and dung, but in the poorer ones neither the walls nor the floors are treated, though a mat is usually spread on the floor.

These houses are better ventilated than some of the mud-brick houses because fresh air enters freely through the interstices of the brushwood, but as the door is the only opening for light and it is often kept shut, they, like most of the dwellings in the Protectorate, are dark. (The plan of a good brushwood house seen at Shuqra is illustrated on page 39*). Variants of the brushwood hut are the very primitive conical palm leaf huts of Wadi Ma'adin and the more elaborate huts seen in Wadi Timnan, whose framework was of solid trunks of palm trees.

These houses are usually surrounded by a brushwood stockade and in the better houses the area just in front of the door is beaten hard and plastered with mud and dung. In the enclosure goats, chickens and frequently a dog may be kept. In one corner a shelter is erected which is used as a kitchen and there may be another to shade the water pots. Very frequently these enclosures are thickly strewn with all sorts of filth and are very squalid.

Stone houses. The houses of the villages in the foothills are mostly of stone. Frequently they are dry stone buildings but sometimes the roughly dressed stones are cemented with mud and dung and occasionally they are mud-plastered and even whitewashed on the inside.

The instability of these houses was illustrated at Jezaweel, where, two days before our arrival, a house had collapsed, killing a woman and three small children. These small houses consist of one and sometimes of two rooms. Except for the door, one or two very small unglazed windows high in the wall make the only provision for light and air.

The roof is usually made from tamarisk or other brushwood and, like the floor, is plastered with mud and dung.

These single or double-roomed houses are called "daimas". They frequently have about 8 x 12 ft. floor space and are 6 ft. high.

Houses of two or more storeys are called "dars" even, as is frequently the case, if the two storeys consist of only one room on top of another. They have advantages as fortresses over the lowlier daimas and their upper storey windows are more slits in the wall and are used as loopholes for rifles. The dar has the other advantage in tribal life that the sheep and goats occupy the bottom storey, where they are safer from theft than in the simple enclosures in the stockades of the single-roomed daimas.

* Not reproduced here

In some districts the houses, and especially the doors, seem absurdly small: it is frequently necessary to bend double to enter. Even the more elaborate houses of the Sultans and Sheikhs are dark, the rooms small and the doors low and narrow.

Mudbrick houses. Probably the best type of house in the Protectorate is that made of sun-dried brick. In El Waht we saw these bricks being made. They are made from the local clay soil stiffened with straw or tamarisk leaves. The soil straw and water are mixed to a soft clay and put into a rectangular wooden mould 20" x 12" x 3". The brick is turned out of the mould on to the sand and left to dry. Later the bricks are turned and later still they are placed on edge till they are set firm and dry ready for use.

In the larger villages at lower altitudes, such as El Waht, Shuqra and in the Abyen area, the mud-brick house is the commonest type - the plan of a good Shuqra mud brick house is illustrated on page 37*.

Some of the mud-brick houses have as many as six rooms in three storeys. Even these houses have a brushwood stockade for the livestock but in them usually the cooking is done inside the house.

General Notes. In the smaller houses little consideration is given to ventilation, and the door plays the most important part in the passage of fresh air into the rooms.

Even if there are windows they are closed at night and the occupants seem to be entirely content with the vitiated atmosphere of rebreathed air.

The same rooms are used both as living and sleeping rooms, but it is especially at night that the effects are most manifest. For much of the year even at low altitudes the whole family sleeps in one little room - four on a floor area less than 100 sq. feet is quite usual. In the very hot weather these conditions are somewhat relieved because then the people sleep in their courtyard or on their flat roof tops.

Ventilation is bad in all the houses of the area. The value of fresh air is not understood; in fact, the importance of excluding fresh air is insisted on, especially at qat parties (the qat habit is dealt with more fully in the Nutrition Report).

Muscimir may be quoted as an example of the worst conditions. The floor area of the rooms rarely exceeds 50 square feet. Three to four people sleep in such a room at night with the windows tightly shut. When it is remembered that cases of open tuberculosis occur in Muscimir the dangers of such conditions will be appreciated.

In many of the villages the houses are much too close to one another: the primitive sanitation and the freely roaming livestock render the narrow tortuous pathways between the houses foul and mephitic. Children live and play in these alleys.

Recommendations

The need for improved housing conditions should be kept in every campaign undertaken for the betterment of the conditions and health of the people of South Arabia.

The housing improvements needed are of three main kinds:-

i. Overcrowding should be prevented.
ii. Ventilation should be made adequate.
iii. House sanitation should be provided. This will be more fully dealt with under the heading of Sanitation.

Apart from the improvements needed in the individual houses, steps should be taken to interest rulers in village planning and, as opportunity occurs, the lay out of villages should be improved and attention paid to the distance between one house and its neighbour. The following tentative suggestions are put forward:-

I. Opportunities should be taken to build model houses in each district. Such opportunities are offered by the erection of the Tribal Health Centres and the adjacent houses for the orderlies, as outlined in Chapter IV. Opportunities can also be found in the housing of soldiers, clerks and other Arab representatives of Government as well as in the planning of servants' quarters attached to the houses of officers. It need hardly be repeated that the houses of officers themselves should be properly provided with sanitary accommodation etc.

It is suggested that these model houses should not be built to one standard pattern but should, in each area, be related to the available building materials and should take into consideration local custom and the experience of local house builders.

II. Health talks from the Health Orderly and the visiting Medical Officer should include instruction on the dangers of overcrowding, the need for adequate

* Not reproduced.

ventilation and the importance of proper house sanitation.

These subjects could usefully be taught wherever the diffusion of sound health principles might result in the practice of healthy living and especially where the local rulers show interest. They might form part of a hygiene course at the School for Sons of Chiefs.

III. So long as the tribesman must look upon his house as a fortress built to stand the rigours of the blood feud and tribal fighting, small doors and tiny windows will be a feature of the houses.

It is of course, beyond the province of this report to explore means of guaranteeing individual security in the tribal areas, but the need for such security is once again underlined.

11. NUTRITION

We are very greatly indebted to Mr. HARTLEY, Agricultural Officer, Aden, for much of the information under this head.

The following summary of available foods in the Western Aden Protectorate may be of interest and will be considered before proceeding to suggestions for improvement.

Sources of Carbohydrate

It is worthy of note that in certain districts within easy reach of Aden there is a tendency to use rice and flour, both imported from abroad. These tendencies should be discouraged, not only because the wide use of these foods will depress local trade in home-grown cereals, but because the imported foods are poorer in vitamin B content. The only good points (and they are features which commend them to the people) are that they need no preparation before cooking and they are more easily cooked.

The Cereals. The cereal crops vary from district to district, as might be expected in an area with such marked differences in altitude and rainfall, but throughout the whole area Sorghum vulgare is found in its different varieties.

Next in importance to Sorghum, and occurring almost as widely, is Pennisetum typhoideum. In wadi areas Zea Mays is fairly common and in higher altitudes there is some barley and wheat.

Less common but also worthy of mention are Panicum miliaceum, Eleusine coracana and Eragrostis abyssinica.

In addition to the food value for man one of the criteria of a good, that is a suitable, cereal in South Arabia is its incidental production of fodder for animals. Farm animals are essential to the life of the people and without them the tribesman's lot would be harsh.

Other criteria, more evident in some areas than others, are small water demand, drought resistance, ability to stand up to heat, quick cropping and a good head.

Sorghum vulgare or giant millet is known generally throughout the Western Aden Protectorate as 'Dhurr' and it is the most popular cereal grown. At least five varieties are met with. These vary in colour from pure white to dark red-brown and in shape from a closely packed solid head to a loose open panicle.

The variety names used in the Protectorate vary from place to place - Saif, Bukr, Ghorba and Hub, or forms of these, are the variety names in the Abdali and Fadhli areas. Aubali, Sherchi, Gori, Korti and Jidia are the variety names reported by Mr. Hartley from the Dhahir (Audhali) plateau, while on the Kaur El Audhali the names Sonosali and Heima are used for the white and red millet respectively.

The period from sowing to harvesting varies very widely; from 70 days in the lower altitudes with good water supply to 9 months in the mountains.

Several of the varieties of Sorghum grown in the Western Aden Protectorate, especially Saif (a white variety) and Bukr (a red brown variety), supply good grain and give good yield of fodder, while other varieties such as Ghorba and Hub (both brown varieties) give good grain but are much poorer in fodder yield.

Pennisetum typhoideum, or bulrush millet, is known throughout the Protectorate as Dukhn. It is second in popular favour only to Sorghum and its growth is usually limited to poorer soil. The grain yield is good but the fodder is so poor that the straw is not harvested. After the Dukhn heads have been cut the stalks are left standing and the animals are turned to graze in the high stubble.

The average time from sowing to cropping is 70 days and it is sometimes sown early on land later to be sown in Sorghum.

The habit of grinding the whole head with its central "cob" is practised in the very poor areas and has been commented on in the Jehaf area - an area which Mr. Hartley calls an "agricultural slum".

Zea Mays, or Indian corn is most commonly called Hind but in some places is called Rami and in others Sin. It is mostly grown where there is a perennial

stream and is watered by flow irrigation from the stream, but in Yemen it is grown by irrigation from wells. The time from sowing to cropping is about 90 days. In some places it is cropped twice in the cooler months and followed by Sorghum in the hot weather. The straw of Indian corn has a very poor fodder value,

Wheat, barley and some rye, known respectively as Bur, Shair and Alas, are grown in the highlands. Barley is preferred because it is "rust" resistant. Both wheat and barley are short in the straw and give a relatively poor fodder yield.

Panicum miliaceum or Indian millet Sayyal is described by Mr. Hartley. He says that above 2,000 feet it gives a good yield as a catch crop fifty days from sowing.

Elusine Coracana or finger millet is called Kenob. It is a summer sown cereal grown largely by the Higris. It is especially interesting because it has the highest calcium content of all the cereals mentioned and the Protectorate dietary does lack calcium. This cereal is also interesting in that it stands thinning and transplanting.

Eragrostis abyssinica, or tiff, is known locally as Tohaf. It is a catch crop grown almost solely by nomadic Higris who say that it is of great nutritive value and good for stomach troubles. The crop is found in Abyssinia and may have been brought from there by the Higris. (See footnote*)

THE SEASONAL VARIETIES, THE STORING AND THE PREPARATION OF GRAIN

The following notes from Museimir may be taken as typical of the maize-sorghum growing areas at middle altitudes.

Indian corn. The first crop is harvested about January and often the second crop is dibbled in between the rows of ripening maize to enable the second crop to be harvested in April.

Sorghum is then sown and may be harvested any time between October and the end of the year.

These are the main crops of the area but some pennisetum and barley are also grown.

STORING. The grain is kept on the roof of the house or stacked in the courtyard for current use. Those people who have more grain than they need for current use store it in deep holes in the ground (madafin). One hole (madfan) will take as much as 100 bags of grain and in these stores the grain keeps well for years.

PREPARATION. Each household possesses a greater and lesser mill. Mathin Qaim (standing mill) Mathin birk (kneeling mill). The first consists of two grind stones about three feet across and some 4 to 5 inches thick. A wooden handle is let into the upper stone near the periphery and by this it is rotated on the lower. In the centre of this upper stone there is a hole into which the corn to be ground is poured.

The smaller mill is a simple block of stone about 9" x 12", slightly hollowed about the centre in its longer axis. On this the material is worked by a spindle-shaped stone rather like the whetstone used for sharpening scythes in Britain.

The milling of the grain in the large mill is only sufficient to break the pericarp (especially in the case of Indian corn and Sorghum which has been stored.) After this the grain is winnowed and may then be milled a second time in the large mill (especially if it is hard and has been stored). The rough meal so obtained may be boiled without further milling to make porridge ('aseed). To make bread the first millings are steeped for two or three hours in water and then become soft enough to "work" on the smaller mill.

(This year's "grain" is sometimes soaked for the small mill without previous grinding.)

As the grain is "worked" water is added little by little till a fairly smooth dough is formed. To this salt is added and the bread is baked.

The popular type of oven is of a beehive shape and is made of sundried mud. A brushwood fire is started inside the oven and as soon as it is a clear red and the smoke has abated the dough, which has been worked into circular flat cakes of the desired size is applied to the sides of the oven where it adheres. The fire is then damped down. The lid is securely applied and covered with a dump cloth and the small vent hole in the bottom of the oven is closed with mud. When, after a known time, the lid is taken off the bread is ready.

*The rickets-producing action of certain cereals is referred to in Brit. Med. J., 1928 Dec. 14, and elsewhere. It would be interesting to know how millet compares with other cereals in this respect.

Roots. Certain root crops form additional sources of carbohydrate but consideration of these is delayed till later where vegetables will be discussed, mainly as sources of vitamins.

Sources of fat

Surprisingly little fat is eaten in the Western Aden Protectorate and nearly all is of vegetable origin.

The main sources are Sesamum indicum, known locally as Jiljil, and Mustard seed (called Khardal); a very little cocoanut oil is used near the coast.

In some places the wealthier people use butter or ghee (called samn.) Fat from the tail of fat-tailed sheep, which is so popular in Aden, is practically unknown in the Protectorate and so are other types of mutton and beef fat.

Sesame is grown on inundated ground especially at Lahej, Abyen and in the Beihan area. It is sown in October and cropped in early March. It is not often found growing above 4,500 feet.

The seeds are collected and ground in an oil press. The oil cake left in the press is highly valued by camel owners and dairy farmers. Mr. Hartley has drawn our attention to the American Agricultural Year Book for 1934, where Sesame seeds are especially noted as being rich in calcium (1%), of good protein value and containing phosphorus. It was recommended that they should be used undecorticated.

Mustard can be grown at greater height and is pressed in the same way as sesame.

Coconut oil is imported.

Butter and ghee are usually imported, but some is produced in the hills; in Yemen they are fairly widely produced for home consumption.

Protein sources

It will have been noticed that there is a grave lack of first class protein in the dietary of the Western Aden Protectorate. Butcher meat is so little used that it will not be discussed as a present source. The sources to be considered are fish, milk and pulses.

Fish. On the coast the lack of butcher meat is amply met by the use of fish. The supply of fish is not only locally adequate in these coastal villages but in certain seasons is sufficient for export to inland villages right up to Museimir.

The method of preserving fish used at Qod Amber is as follows:-

Holes are dug in the ground about five feet deep and four feet across. These are walled up with stones like a lined well and constitute the fish curing ovens. A wood fire is kindled in the oven, then the fish, after being cleaned and gutted, are thrown on to it. The fish are then covered with matting and the whole covered with sand. This is usually done about sunset. The "loaded" oven is left till the next morning and by then the process of smoking and part cooking is complete. The fish so prepared is dark brown in colour and seems to keep well. On the sea shore at Qod Ambar is a shed for this smoked fish and, after being removed from the oven the fish is taken there for storage and for weighing so that the Sultan may get his proper share of the profits.

In the courtyard of this shed we saw fish being prepared by another method. They had been gutted and salted and were lying out in the sun to dry. A heap of debris from the smoking ovens lay at one side of the courtyard. In this mixture of sand and charred wood children were scraping for bits of fish, and beetles were in keen competition with them.

This valuable source of protein is made further available by the practice of drying and salting sardines (wizif). These and other methods of preserving fish could with advantage be greatly increased in scope.

Milk. Milk and milk products are widely used by a few shepherds and by the nomadic pastoral people such as the Subeihi tribes met inland from Khor 'Umeira, but on the whole the use of milk is much less than might have been expected, and the yield per milch animal seems in any case to be very small.

Other animal sources. Nearly all the eggs produced are sent to market, many of them to Aden, while in Kirsh during the survey we found it difficult even to buy them, though there were hens in every village, because they had been promised to Aden.

Chickens are seldom eaten but so far as is known there is no prejudice against them being so used. Rhode Island Reds have been introduced into the Audhali country by Mr. Hartley where they are now wide spread. White leghorns have been introduced to the Amiri district.

Pulses. These sources of vegetables protein are not lacking in the Western Aden Protectorate and might with great advantage be more widely used. The main pulses grown are Vigna Catjang, Phascolus Mungo (Var. radiatus), Dolichos Lablab, Cajanus cajan and French bean.

Vigna Catjang or cowpea, known in the Western Aden Protectorate as Dijr, is grown over a wide area - frequently it is interplanted with wider spread cereals such as Sorghum and Pennisetum. In most places it is gathered before the grain harvest. Dijr is also grown as fodder and the vines fed green to stock.

Phascolus Mungo (Var. radiatus) or black gram, is also known as Dijr. It is grown under conditions similar to cowpea but is less common. It occurs mainly on the coastal plain and in the Lahej area. The fodder yield is poorer than that of cowpea.

Dolichos Lablab or the field bean, is known as Fasulia. It is grown in the middle altitudes and is interplanted with Pennisetum. It grows well and yields a good fodder supply.

Cajanus cajan, the lentil called Bilsin, grows well in the higher plateaux. It is a favourite crop in Yemen and gives a good fodder yield.

Sources of accessory food factors, minerals etc.

The vitamin lack in the Protectorate dietary is at once obvious from a study of Table II. The findings recorded in this table, correlated with those in Table I, especially regarding teeth and rickets, suggest that there is also a lack of calcium. That this is the only inorganic deficiency is unlikely and a lack of at least iron and phosphorus is also suspected.

Vegetables

Vegetables would seem to be a recent introduction into South Arabia. Some were probably introduced to Yemen late in the Turkish period and have percolated south. Others have been introduced from Aden via Egypt and India, while others have come from Abyssinia.

The vegetables now grown in the Western Aden Protectorate include radish, carrot, sweet potato, potato, onion, beet, tomato, ladies' fingers, egg plant, cucumber and various gourds.

More recently, in suitable areas, experiments have been made with the growing of other European vegetables e.g. brussels sprouts, cauliflower and kale.

Radish called Baql, is very widely used and in many cases is the only vegetable ever taken. It is usually consumed raw and the leaves are eaten as well as the root.

Sweet Potato is the commonest root crop met with in the Western Aden Protectorate by Hartley. It is grown in areas where there is a plentiful water supply from running streams or from well irrigation. The roots are lifted and used or sent to market. No attempt is made to store them.

Onion and Leek. These are fairly common especially in the higher altitudes and near to good wells. They are often used as a constituent of 'Hulba', described later.

Carrot occurs mainly on the Yemen border and though common in Yemen itself is not much used in the Western Aden Protectorate. Some of the varieties are pale in colour but presumably better varieties could be introduced.

Potato. The ordinary potato has recently been introduced with success in certain areas, but it is grown for the Aden market.

Tomatoes, Ladies' fingers and Eggplant, are also grown mostly for the Aden market but in the areas where they are grown the local people are taking to them. Tomatoes especially are popular in some areas but they are usually eaten cooked.

Outside the areas where they are grown the use of vegetables is not understood by the people; this would seem to be a useful subject for propaganda.

FRUITS

Dates are probably the only fruit widely known throughout the Western Aden Protectorate though melons and bananas are common enough on the coastal plain, especially in the Wadi Tiban.

A wide range of fruits is grown in the gardens of the Sultan and others just above Lahej. This includes:- custard apples, papayas, citrus fruits, guavas, peaches and a few grapes. In the markets along the border most of these fruits

be found during the Yemen season, when they are brought in from Yemen along with apricots, figs and pomegranates.

Although the list of fruits and vegetables is quite considerable, they are really very scanty in quantity and are available only to the wealthier people, and apart from dates the only economically available fruits are wild cherries and melons.

Wild Cherries. The fruits of the 'elb or jube jube tree grow prolifically in some areas and are dried and sold in markets throughout the area.

Melons. Musk, water and cantiloupe are grown as regular crops in the Fadhli and Subeihi areas. They are of good quality, require only one inundation and have a low production cost, but transport and marketing make profit so small that their consumption is limited to a small area around the actual source.

Condiments, Beverages etc.

Spices are relished by the Arabs and a wide range of flavours is available in their markets. Cardamom, ginger, clove and cinnamon are among the favourites, but the most interesting is probably fenugreek.

Trigonella Foenumgraecum or fenugreek is known as Hulba throughout Arabia. The plant is grown in Yemen and the seeds are used to make the very popular dish going by the same name. The following is the common method of preparation. The seeds are ground in a mill and from the resulting powder the Hulba is made. A small quantity of powder - a handful to the pint - is put in water and left for three hours. This first water, which is bitter, is poured off and the remaining paste beaten with fresh water. The mixture froths, thickens and rises like the beaten white of egg. When this frothy stage is reached various ingredients may be added, salt, powdered chillies (green or red) and pepper are the common ones, but in some areas leeks, onions and mint may be pounded into a paste and stirred in. In the areas where dry salted sardines are eaten, these may be pounded down and added. The whole dish is set before the diners who dip their bread in it before eating.

Coffee. The commonest beverage in the Western Aden Protectorate is made, not from the coffee bean, but from the outer husk of the bean, which is removed before the coffee is packed for export.

In some cases the husks are roasted and ground before use while in others the husks are put with water into a stone coffee-pot and boiled. In either case the infusion is usually flavoured with ginger, but may be drunk without. Sugar is not usually added but the beverage is slightly sweet, probably because the husk is a form of dried fruit. It would be of interest to discover how the alkaloid content of this husk coffee - or Qishr as it is called - compares with the ordinary coffee prepared from the bean.

Qat. No medical report on the people of South Arabia would be complete without reference to the habit of chewing Qat.

The sociological habits of man in many countries include the use of articles taken by the mouth, such as alcohol and betel nut on the one hand and opium and hashish on the other, which are on or over the borderline between rational feeding and drug addiction. Qat must be included in the list of those that are over the border line.

Several conditions of chronic poisoning due to articles taken by the mouth are now described in the text books. These include lathyrism, atriplicism and the like. Among those due to leaf chewing, Qat cachexia deserves a prominent place.

The following notes on Catha edulis sum up our present knowledge but further investigation should be encouraged.

"It may not be out of place to begin these notes with a reference to the pronunciation and transliteration of the Arabic word of which Catha is the Latinised form."

"Various writers have written it qat, kat, gat, ghat, khat and even 'Yat'! Arabists on the whole have now accepted "q" as the appropriate symbol for Arabic's second "k" so "qat" is undoubtedly the correct spelling. As to pronunciation the "q" is a sound between a "k" and a "g" but the ordinary reader making no pretension to Arabic scholarship may safely pronounce the word as we pronounce cat".

"The chewing of the qat leaf is a very common habit throughout South Arabia. It is especially common in Yemen, the Western Aden Protectorate and in Aden town where the import customs on the leaf bring in some three hundred rupees per day.

In San'a and other principal towns of Yemen it would not be too much to say that the habit is universal. The Yemenis say that the habit was introduced from Abyssinia some three hundred years ago."

"The qat tree may grow to a considerable height, it is a straight limbed stately tree with a silvery bark. Altogether it is not unlike a silver birch but the best qat is usually to be got from bushes not higher than six or eight feet."

"The parts of the tree chewed are the tender shoots at the ends of the younger branches, the newly opened leaves and the leaf buds. To the foreigner who may chew a leaf or two just to know what it tastes like it has an astringency which, while not unpleasant, has no special attraction. As a boy one sometimes chewed similar fresh leaves from hawthorn trees and the flavour reminds one of that."

"A bunch of qat, as sold in the market, consists of some dozen young branches about eight to twelve inches long. They are wrapped in other green leaves and are kept damp so that they will still be fresh when they reach the consumer. At a qat party the parts to be chewed are nipped off one by one and the older leaves and branches thrown on to the floor, where with the wrapping leaves they form a mass of untidy litter. Very wealthy folk may get a slave to nip off the tender pieces and serve them up on a saucer, but it is much more usual for each man to pick his own."

"Qat eating time in San'a is from 2 p.m. to 8 p.m. That is from after the main meal of the day and until the time of evening prayer. The hold which the habit has on the populace may be judged by the fact that in this extremely conservative country it has changed the tradition of a thousand years. The Moslem prays five times a day - at dawn, noon, 3 p.m., sunset and 8 p.m. Those who are real qat eaters say their noon and afternoon prayers in one, before the party, and their sunset and evening prayers in one after the party."

"Every house is built with at least one qat eating room and often with two. The second one is used by the women of the house. The room is usually one with a good view. The party in quite a small room might number twenty. They sit around the wall, each with his bundle of qat before him. All the windows and doors are shut and three or four hubble bubble pipes are lit. Qat is chewed, not eaten. The mass of chewed leaf is allowed to accumulate between the back teeth and the soft tissues of the cheek so that the cheek is bulged out like a huge gumboil. When the party gets under way there is almost complete silence for a long time. This silence is punctuated only by the gurgling of the pipes. Then first one and then another of the revellers feels his cheek too distended for comfort and reaches for his cuspidor. These cuspidors are often very beautifully ornamented. They are of brass, shaped like large double-ended egg cups and often richly inlaid with silver and lacquer. Each person at the party has a cuspidor put beside him. Noisily and with the help of a forefinger a man empties the dark green paste from his cheek into the cuspidor. Then he takes a long deep draught of cold water and resumes his packing. Thirst is one of the first noticeable effects of qat."

"As the party proceeds and the air becomes riper folks begin to perspire. No one feels that he has had a good time at a qat party unless he has sweated freely - and San'a has quite a cold climate. Whether this sweating can be properly attributed to the action of qat or not is difficult to say. The packed room, the hubble bubble pipes and the tight shut windows must also play their part."

"For the most part, and always in the early stages, the qat party is a silent affair. Now and again when a man's cheek is empty he may pass a remark or two. If he is a poet he may recite. If he possesses a radio he may give his summary of the day's news and now and again someone else will comment on what he has said, but the conversation is disconnected and without animation. The news passed on later from these parties may have no resemblance at all to any that ever emanated from a loud speaker. The Arabs themselves say, and this has been verified by the few Europeans who have tried sufficiently to know, that at this stage they begin to "feel good". In fact they have a special word for the condition. They say that they have "Kaif". Kaif is rather difficult to translate in this sense. It means among other things that they think very clearly - they understand problems not formerly understood - they can think out poems of marvellous beauty without any effort - they feel superior to the generality of mankind. During or immediately subsequent to this stage there is a sense of complete contentment with things, and again silence reigns."

"If at this stage a normal visitor comes into the room he sees a group of glassy eyed men - quite conscious - they respond to his salaams and apart from a certain slowness in speech are almost normal in behaviour. If he has come on business and asks any questions which require active cerebration he is likely to be met with a glassy stare or a fatuous smile. Dr. AFFARA of Sheikh Othman is of opinion that this vacant look when spoken to is due at least in part to deafness induced by qat. Anyone in this stage who is entrusted with a message will almost certainly forget it."

"As sunset approaches the party begins to thin. The qat is done and conversation begins to brighten up a little. A window or a door may now be opened and by the time of the eight o'clock prayers folks are more or less normal. At no period have I seen any signs of ataxy in the gait and there is no drowsiness."

"Sleeplessness is a common late effect of qat and gastro intestinal upsets are common, especially obstinate constipation. I have seen more than one case diagnosed as acute appendicitis who cleared up after an enema and who in fact was suffering from qat constipation."

"The chronic qat eater is usually very thin, his musculature is poor and his cerebration may or may not be continuously affected. Very many qat eaters complain of sexual impotence. Several qat eaters have unexplained ascites; it has been thought possible that they were suffering from cirrhosis of the liver due to chronic qat intoxication."

"If a qat eater is deprived of his drug for some days - even in some cases for one afternoon - he becomes restless, irritable and useless for any kind of work."

"Qat is expensive because it must be eaten fresh and usually has to be carried from a distance to the consumer. In Yemen the trade is so profitable that vines are being pulled up from land which has for generations been producing grapes and qat is being planted instead."

"In spite of its cost the poor of the towns must have their qat as well as the rich. Many soldiers in the army chew it. Of the poor many can get some at the qat party of a rich neighbour, but often a man will go without food and leave his family to beg rather than go without qat."

"Qat is expensive not only of money but also of time. A great class of "half day men" has grown up in San'a and in other towns. Whatever work they do is done in the mornings. The afternoon is sacred to qat. This class is not by any means confined to wealthy people. It includes for example such people as soldiers and hospital servants. Post offices and other government departments which are open in the afternoon have their premises adapted for the daily qat party of the staff."

"To sum up, the effects of qat are:- Physical. i. Thirst, perspiration (?), "kaif" contentment. The observer sees a slowing of cerebration - a wild and glassy look. ii. Sleeplessness and constipation. iii. Decrease in mental power, loss of sex potency and cirrhosis of the liver (?). iv. Qat cachexia."

"Social: i. Waste of money. ii. Waste of time. iii. Waste of land and iv. the people are said by their rulers to be more biddable!"

Infant Feeding

Education in infant and child welfare is another matter which must receive attention in any programme of health propaganda for the Western Aden Protectorate. The outstanding fault we have to find in infant feeding was the habit of keeping children on the breast until - and sometimes after - the age of three. This is partly due to tradition, partly to save outlay on other food and partly because of a belief that it prevents further pregnancy.

Recommendations

The recommendations for raising the nutritional level of the Western Aden Protectorate are set out below under five heads:-

1. Recognise the need.
2. Increase the quantity of available food.
3. Remove certain economic barriers to greater production.
4. Increase facilities for distribution.
5. Dispel ignorance.

1. The Protectorate's greatest need. There is no doubt in the minds of the Medical officers of this survey that the outstanding need of the people of the Western Aden Protectorate is the raising of the nutritional level. They are a chronically starved people. The almost unbelievably poor diets described from Kirsh and Jebel Jehaf are only extremes of widespread under-feeding.

The lack is not only qualitative, due to ignorance of dietetics or absence of vitamins, but pre-eminently quantitative, due to a number of factors of which the arid and harsh geographic conditions are only one, and perhaps not the most important.

2. Increase the quantity of the available food. The foods which are available in the area could, if produced in sufficient quantities and distributed efficiently, meet all the nutritional requirements of the people, and in the recommendations which follow an attempt is made to keep within the orbit of these already available foods.

The cereals are of good quality and come most nearly of all the foods available to being adequate in quantity. Sorghum is especially valuable because of the importance of animal husbandry and the need to produce fodder for the beasts as a by-product of grain-growing for human consumption. There is work to be done in selecting the best variety for each area, in introducing new cereals and in increasing the yield where possible.

The protein intake of the people of the Western Aden Protectorate is extremely poor and as a whole they do without red meat. Fish is the main standby in places within reach of the sea. A method in use for preserving fish has been described from the Shuqra area, but education in fish curing, salting and drying is needed and a much wider distribution of fish should be encouraged. Inland fish markets such as that at El-Waht should be inspected from time to time and a decent sanitary standard maintained.

In the mountainous districts the people have not come to regard fish highly as an article of diet, but if the supply is found to be adequate and transport can be arranged it is recommended that steps be taken to encourage fish eating even in these remoter areas.

Milk products are next in importance. In Yemen the use of yaghoort is widespread, especially on the Sana' plateau, and its use should be encouraged in the Protectorate. Yaghoort is not only a valuable source of first class protein but is safer to use than the whole milk because it is so much less likely to convey dysentery and typhoid. Cheese making is an art well known in the Yemeni highlands and could with advantage be recommended to the people of the Protectorate.

The great difficulty in carrying out these recommendations is the surprising fact that shepherds with large herds of sheep and goats have only enough milk for their own needs. The question of increasing the milk yield seems worthy of further investigation.

Pulses are widely grown in the Western Aden Protectorate but their use in human diet is much too little. This could presumably be improved by education. It seems probable that beans and lentils would be more popular and more useful than cowpea and black gram but the preferences of the district may have to determine the crop advised under this head. In any case these valuable vegetable proteins should be made more available and their use more widely encouraged.

Apart from the increase in fats that would be incidental to a greater milk consumption, no immediate suggestion is offered for the increase in the fat intake. The present fat intake is very low, but beyond a possible increase of the acreage for vegetable oil and the use of oil from fish, there seems nothing to be done about it for the present. The subject should be more adequately explored.

Of fruits and vegetables there is no lack of variety, but there is no wide appreciation of their value. A properly used propaganda would almost certainly yield good results in this area. The following example may be quoted. During a recent outbreak of night blindness in the Yemeni army each patient sent for treatment was told that raw tomatoes were good for the eyesight. The news spread quickly amongst the troops. Tomatoes are available on the Sana' plateau and are cheap. Tomatoes are now eaten raw by many of the troops.

3. Remove certain economic barriers to greater production. There seems to be good reason for the belief that if the fertile soil was intelligently used the dietary lack of the Protectorate could be almost entirely met. The facts which militate against this seemingly simple solution are unfortunately sociological and political and probably very difficult to deal with. The following are among them:

(i) Insecurity of land tenure.
(ii) Oppressive conditions, of taxation etc., which completely discourage the desire to get a bigger yield.

(iii) Exorbitant rates of interest charged by money lenders who lend money (or grain) for sowing and take three times the equivalent in grain at harvest time.
(iv) Insecurity due to blood feuds and tribal fights.
(v) Waste of the best land in certain areas - especially the Dhala plateau - on the growth of qat.

In connection with items (i) to (iv) it is realised that any recommendations are outside the province of this survey, but one suggestion will be made with regard to the last point.

The land given over to the growing of qat is on the increase. In Yemen good vineyards have recently been uprooted to make room for more of this pernicious tree. In the Western Aden Protectorate there are areas to which the habit has not yet penetrated. It is suggested that local rulers might be appealed to to ordain that no further ground should be given over to the growth of qat in the Protectorate.

Here again the use of propaganda will help, but in this case the matter is not likely to be easy to remedy for we are up against an ingrained social habit with concomitant vested interests - albeit it is not the habit of centuries, for it would seem that the introduction of qat from Abyssinia was fairly recent.

4. Increase the facility of distribution. Throughout the Western Aden Protectorate there is a very heavy restriction on the movement of foodstuffs because the inter-tribal customs tolls are so high.

Again this is a matter beyond our scope but it needs to be mentioned as one of the malignant customs which combine to reduce this people to the state of chronic starvation in which we found them. One suggestion is made. A list of privileged articles of paramount food value might be prepared and local rulers asked to exempt these from customs tolls.

5. Dispel ignorance. The need for education in the proper use of available foods and the production of others must be borne in mind in any future plan for the betterment of health in this area. The 'health orderlies', the tribal health centres and the visits of medical officers are discussed in the final chapter in this report. Nutrition should form a salient part of their propaganda. The use of loud speaker vans and lantern talks might be made a feature of the medical officers' visits. Demonstration garden plots might be maintained at the health training centre. The whole relevant chapter (No. XII) of "Nutrition in the Colonial Empire" should be carefully studied and its practicable suggestions tried out in the Western Aden Protectorate.

NUTRITION FINDINGS Table 1

Place	Condition of Teeth	Condition of Gums	Occurrence of Rickets	Occurrence of other conditions suggesting Dietetic Deficiencies	Comments
Shuqra	Fairly Good	23% Spongy 13% Gingivitis	11% under 10 14% under 15	S.K. 15% N.B. 4% (Y.U. 5% S.S. 10%)	
Abyen	24% carious or irregular eruption	44% Spongy	13% under 10	SK. 5% (Y.U. 2½% S.S. 2½%)	
Haski	31% carious or irregular eruption 12% under 10 Yrs. irregular eruption	42% Spongy 22% Gingivitis or Pyorrhoea	24% under 10 25% under 15	SK. 13% (Y.U. 2% S.S. 10%)	
El-Waht	40% carious or irregular eruption 10% under 10 Yrs. with irreg. eruption	51% Spongy 10% Gingivitis or Pyorrhoea	11% under 10 14% under 15	SK. 3% (S.S.2. Ph.1)	
Tor am Baha	45% carious or irregular eruption	51% Spongy 6% Pyorrhoea	16% under 10 15% under 15	SK. 12% (Y.U. 7% S.S. 3%) N.B. 1% A.S. 20% (School boys)	3 cases with bleeding gums.
Khor-'Umeira	31% carious or irregular eruption	37% Spongy 12% Gingivitis	6% under 10 5% under 15	SK. 2% (S.S. 1% Ph. 1%) N.B. 1% Corneal Blisters 3%	1 case bleeding gums.
Museimir and villages of Wadi Tiban	40% carious or irregular eruption	70% Spongy 9% Gingivitis	11% under 10 10% under 15	SK. 17% (S.S. 8% Y.U. 4% Ph. 5%) N.B. 4%	
Kirsh	41% carious of irregular eruption	51% Spongy 1% Gingivitis 5% Pyorrhoea	7% under 10 5% under 15	SK. 7% (S.S. 5% Y.U. 2%) AS. 2% N.B. 4%	

NUTRITION FINDINGS Table 1

Place	Condition of Teeth	Condition of Gums	Occurrence of Rickets	Occurrence of other conditions suggesting Dietetic Deficiencies	Comments
El-Milah	74% carious or irregular eruption	64% Spongy 2% Gingivitis 8% Pyorrhoea	15% under 10 14% under 15	SK. 25% (Y.U. 7%) AS. 2% Chalk grains in corneal 2%	
Jebel - Jehaf	44% carious or irregular eruption	58% Spongy 10% Gingivitis 2% Pyorrhoea	15% under 10 14% under 15	SK. 16% (Ph. 8% S.S. 4% Y.U. 4%) N.B. 3% AS. ½%	36% of the people had some skin disease.
Dhubiyat	48% carious or irregular eruption	73% Spongy 5% Gingivitis	NIL	SK. 9% (Y.U. 7½% S.S. 1½%) AS. 1%	
Wadi Turan	35% carious or irregular eruption	70% Spongy 9% Gingivitis	17% under 10	-	Very few people seen.

Notes:- S.K. Skin conditions associated with dietetic deficiencies. Y.U. Yemen Ulcer. S.S. Septic spots in skin.

N.B. Night Blindness Ph. Phrynoderma. A.S. Angular Stomatitis.

The following system of scoring is suggested. The ideal in each area would be zero:

Unhealthy Teeth:	20% and under 30% (1).	Under 40% but over 30% (2).	Under 50% but over 40% (3).	Over 50% (4).
" Gums:	20% " " 40% (1).	" 50% " " 40% (2).	" 60% " " 50% (3).	" 60% (4).
" Skin:	2% " " 5% (1).	" 10% " " 5% (2).	" 15% " " 10% (3).	" 15% (4).
Rickets.	5% " " 10% (1).	" 15% " " 10% (2).	" 20% " " 15% (3).	" 20% (4).

By such a method the above areas fall into two groups: (1) Those scoring between 5 and 10 points, and (2) those scoring over 10, as follows:-

Group I. Khor 'Umeira (5) Abyen (7) El-Waht (9) Kirsh (9) Dhubiyat (10) Shuqra (10).
Group II. Haski (11) Wadi Turan (11) Museimir (13) Toram Baha (13) El-Milah (13) Jebel Jejaf (14).

In this assessment Kirsh comes off better than expected and El-Milah worse but otherwise the result seems correct. See table 2.

NUTRITIONAL FINDINGS Table 2

Analysis of diets consumed related to the general physique of the people:- According to the accepted standards this table shows faulty feeding in every area except El Waht. In Kirsh and Jebel Jehaf the diet seems almost unbelievably poor in value. In the hill areas there is a grave lack of first class protein. In most cases there are vitamin deficiencies.

Place	Meat and Fish	Staple	Milk and Butter milk	Fruit and Vegetables	No. of meals per day	Physique	Comments
Shuqra	Meat - rare Fish - daily about ½ lb.	Jan.-June-Sorghum vulg. Oct.-Dec. Penn. typhoideum.	Little	Radish. Fresh Tomatoes available. Tinned Tomatoes.	3	less than satisfactory	Breast feeding up to 3 years
Abyen	Meat - rare Fish - regularly	Millet Bread and porridge. Sorghum vulg.	-do-	Available for 6 months in year. Used cooked	3	-do-	
Haski	Meat - rare Fish - regularly	-do-	Regularly	Radish, raw. tomatoes, egg plant and okra hulba - little fruit	3	-do-	
Toram Baha	Meat - rare Fish - dry salted sardines regly.	Sorghum vulg. Penn. Typhoid Zea Mays	Nearly all have same	Radish and leek weekly hulba and qat	2		Poor
Khor-'Umeira	Meat - rare Fish - daily lb. fresh fish. Also salted sardines	Fish - Staple Bread and porridge from stored cereals	Most people nil Herds, some	Nil	1 or 2	Satisfactory	Breast feeding for 3 years
Muscimir	Fish - dry salted - sardines twice weekly. Meat - rare	Zea Mays Sorghum vulg.	Butter milk about 1 pint, whole milk 5 oz.	Radish, leek, onion weekly: tomatoes available: qat: fruit in season	3	Less than satisfactory, children pot-bellied	Dried salted sardines used to increase milk of nursing mothers
Kirsh	Meat - weekly Fish - rare	Sorghum vulg. Zea Mays	Sherpherds a good supply: otherwise little	Radish, leek, red carrots regularly fruit very occasionally	2	Less than satisfactory	Diet seems to be at starvation level

NUTRITIONAL FINDINGS Table 2

Place	Meat and Fish	Staple	Milk and Butter milk	Fruit and vegetables	No. of meals per day	Physique	Comments
El-Milah	Meat - regularly Fish - weekly	Sorghum Vulg. Penn. Typhoid. Zea Mays. White flour from Aden	Little	Leek, eggplant, okra weekly: fruit occasional	3	Less than satisfactory	On motor road Aden/Dhala': well supplied.
Jebel - Jehaf	Meat - rare Fish - rare	Penn. Typhoid. (ground whole) Also Sorghum Vulg.	Very little	Leek, carrot, onion radish, turnip weekly	3	Poor	Very poor in 1st class protein.
Dhubiyat	Meat - weekly Fish - nil	Sorghum Vulg. Penn. Typhoid	Little	Weekly	3	Less than satisfactory	-
El-Waht	Meat - regularly Fish - regularly	Sorghum Vulg. also rice and barley from Aden	Little	Radish, raw, tomatoes, eggplant and okra cooked hulbi: little fruit	3	satisfactory	Best fed village visited.

NOTES: Meat - rare. Means during feast times perhaps 4 times annually.

Regularly. Means rather more than once a week.

Milk. Little. Means enough daily for tea or to moisten bread.

Vegt. Available. Means available but not used.

Salt. Adequate throughout.

12. WATER SUPPLIES

Despite the arid nature of the country, owing to the small rainfall, at no place visited could the water supply be regarded as dangerously inadequate. It is true that in certain localities, such as Wadi Ma'adin, the wells were separated by long distances but there is no reason to believe that water could not have been reached by sinking further wells - and the scarcity is thus due to the poverty of the people rather than to any real lack of water. The rainfall brought by the moist S.W. Monsoon to the mountain masses lying along the north and western borders of the Protectorate means that at certain seasons flood waters seek to find outlet in the sea. Thus while certain of the wadis reach the sea during the flood water season, others lose their waters in the sandy belt lying to the south of the mountains. The volcanic rock of the mountain mass, being relatively impermeable, ensures that much of the rainfall finds its way into the wadis, and the settled communities, living as they do for the most part in the wadis, have adequate water from wells, even if the river itself is dry.

In the places visited wells were the commonest source of water and only at Museimir was water taken solely from the river. Museimir, however, stands on a high cliff some 200 feet above the wadi, which at this point has a perennial stream. In one village in Wadi Natid, water was obtained from a small spring issuing from the rocky side of the wadi. The water seeps up through the shallow layer of alluvial soil and forms a small puddle. Since this is the only source for a village of about 60 people the supply must be well below desirable amount. Moreover its position in the wadi bed makes it rather inaccessible and the women must travel half a mile of rocky path to reach it. Where villages lie alongside perennial streams, well water may be supplemented by water from the wadi for drinking purposes, washing and bathing being carried out in the river water.

The villages of Huwemi and Kirsh, lying between the wadis Natid and Hidaba, are unique in their water supply, for in the former village the water is derived from hot springs having a temperature of 140°F. which issue from the ground, while at Kirsh it is necessary only to scoop out a shallow hole in the soft grassy meadows, whereupon it fills up with clear cold water. This supply is apparently inexhaustible.

In most of the places visited the wells were within reasonable distance of the dwelling houses, and the women made at least two visits daily to procure supplies. A common measure per person daily was 3 gallons for all purposes, but in many places this reached 4 or even 5 gallons. Since cleanliness of body cannot be claimed as a characteristic of the Arab in the Protectorate, the water is used mainly for drinking and cooking purposes and should suffice, especially as the extent of cooking is limited. In the notoriously unsettled Subeihi country, the need for defence against unfriendly neighbours has meant that dars (stone houses) tend to be built on precarious but strategic positions on the heights above the wadis. This means that the fetching of the water involves a difficult journey down rocky paths to the wadi below. Such a state of affairs discourages frequent journeys and in areas such as these the value of water procured with such difficulty must be greatly enhanced. El Qara a small walled town in the Upper Yafa'i country is said to be example par excellence of this, for it is perched on a hill above the wadi. In the Wadi Natid the women of the village of Jezaweel had to walk for a mile to the nearest well, but this was the longest distance which came to our notice.

Nature of Water

It was not found possible to make routine analyses of the water in areas visited although this would have been a very interesting study in relation to the diseases prevalent in the district. The water appeared generally to be potable. A number of the hisis (shallow scooped-out wells) found in the vicinity of Khor 'Umeira and used by the little scattered fishing communities tend to become brackish and required frequent changing.

Water taken from the rivers, for instance at Museimir, varies greatly with the season. During the flood season or after rain the water is heavy with silt and assumes a brown muddy colour. No measures appear to be taken to filter off the suspended particles.

The water at the villages of Huwemi and Kirsh was sent for analysis and the report received from the R.A.F. Hospital Laboratory, Aden, is to be found in Appendix IV. The analyst's opinion of its unfitness for human consumption because of its

pollution by organic matter is interesting, and suggests that the waters from other areas may be equally open to condemnation on that ground. While it is true that the waters at Kirsh, issuing from the marshy ground, are more liable to pollution, the wells in other districts run a similar risk because of the custom of allowing the cattle to be watered alongside the wells, and of the usual risk of surface washings.

It is to be hoped that later it may be possible to have samples of water analysed from various districts as some support may be given to the theory that the mineral content of the water plays some part in the formation of renal and vesical calculi. Moreover, bacteriological examination may provide answers to the problems associated with epidemic intestinal infections.

Dangers

The use of river water, even in a sparsely populated country like the Protectorate, gives rise to obvious dangers. Villages for the most part lie along the wadi beds, and since the ignorant tribesmen have no scruples about contaminating the water with excreta, this risk must be added to those following the use of the river for washing, bathing and the watering of the cattle. Water-borne diseases such as dysentery and diarrhoea are not uncommon.

In the three places in which river water is used either for drinking or washing purposes, i.e. Museimir, Haski and Wadi Ma'Adin, we were able to prove the existence of schistosomiasis in the last only. Haski provided no evidence whatever, but Museimir must still be regarded as sub judice (see special report on bilharzia). In the district around Wadi Ma'Adin, definite cases of bilharzia were found and although a common vector could not be found, snails which may possibly be implicated were collected.

Another danger which may occur, although no cases were seen in the course of the present survey, are injuries from leeches.

Wells

These naturally varied both in structure and in depth, from the shallow hisis of Khor 'Umeira to the well designed, covered-in wells at El Waht. All the wells must be regarded as shallow wells, although the wells of El Waht are very deep for here the water table lies at a depth exceeding 100 feet. In Abyen the wells are difficult to maintain, for the water is quickly absorbed through the walls of the well. To obviate some of this loss it is common for the bottom of the well to be lined with palm branches and other available trees and shrubs. This precaution serves also to prevent the well caving in. (see footnote*)

The whole question of wells deserves careful consideration, for in many parts the success or failure of the crops depends upon the availability of water from wells for irrigation.

The communities near Khor 'Umeira are semi-nomadic, and as the water lies near the surface no attempts are made to dig permanent wells.

Where established communities exist the wells are lined with stone and may, in the bigger villages, be lime plastered. Some attempt is made in most cases to protect the well from contamination by raising the well head above the level of the ground. Generally the vicinity is roughly paved with rocks to avoid the formation of puddles. Only in El Waht and Haski was there any real attempt to protect the well from wind borne dust and infected material.

Diagrams of wells seen are appended.**

The comparatively rich community of El Waht have built a number of very well-designed wells which could be an example to other places in the Protectorate. Each of these wells is surmounted by a strong cemented circular well head reached by two steps so that the top of the well head is about 4 feet above the ground level. A further cement wall 3 feet high is built in a concentric circle around the main structure, with entrances. A wooden roof mounted on four pillars completes the structure. Other good features are:-

i. A drinking trough for camels.
ii. A situation at least 20 yards from the nearest house.
iii. A pipe-line connecting well to the neighbouring mosque.

Water is hand-drawn by ropes and buckets.

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* A. Beeby Thompson in his report says of this "the difficulty of cavitation has been partly overcome by an ingenious screening of the well sides with woven tamarisk twigs encircling a plaited brushwood lining" (Western Aden Protectorate Water Problems, May, 1939, by A. Beeby Thompson and Partners; printed as Eastern No.175).

** Not reproduced.

THE WELLS OF EL WAHT - (See Map facing page 26)

Well 1.	By side of school.	Simple stone-lined structure with wooden tripod. Raised well head with rough stones 1' 6" high - No slope.	Depth approx. 100' 5' diam.	Puddles at well head
Well 2.	By side of mosque 340 yrs. old.	Stone-lined. Brick superstructure on 2 sides. 12' high. Has channel to mosque and Mr. MacKowie has also had a stone channel built to carry away water. This is neglected and blocked by debris.	150' deep	Very bad puddles, camels used
Well 3.	Small 5 yds. only from nearest courtyard.	Stone-lined 1 foot plinth No slope. Wooden tripod.	125' deep. Water 5' depth	Tendency for pools to form. Many animals congregate at well
Well 4.	By side of mosque.	Stone-lined with reservoir from which a channel runs to nearby mosque.	100' deep diam. 6'	Little or no contamination
Well 5.	Near Motor Station on edge of village.	Stone-lined. 18" parapet. Has wooden shelter and is protected from blown sand by walls on 3 sides.	Almost 100' deep 4½' diam. 6' depth	-do-
Well 6.	Alongside mosque Haft Omar bin Ali.	Stone-lined well cemented. Stone superstructure. Well sloped.	Over 100'	Few puddles mosque alongside but well away from houses
Well 7.	Excellent well 2 yrs. old only.	Very good stone steps leading to 3' plinth. Good sound shelter. Cement-plastered throughout. Has in addition horse trough and a pipe is to be led to neighbouring mosque.	Depth 150' 7' diam.	Nearest house 15 yds. No puddles. No nuisance
Well 8.	Small.	Stone-lined. No slope. Rough stone parapet 1' high.	Prob. over 80' 4' diam.	Puddles

The common type of well affords very little protection against the risks of contamination, which may be summarised as follows:-

Unplastered wells are easily contaminated by the percolation of infected material through the earth surrounding the well head. Animals are commonly watered alongside the well and carelessness in the drawing of water causes the formation of puddles acting as solvents for the organic material.

Surface washings constitute a danger where no well head has been constructed and the danger may be increased by material adhering to the tins and skin vessels which are used as receptacles for drawing the water.

Sand, carrying infected particles, is a constant hazard and in only isolated cases have attempts been made to lessen this danger. Sand storms occur regularly in some parts and the danger there is correspondingly greater. Stockades of brushwood have been erected in some places to keep out the sand during storms.

Where the well lies within the bed of the wadi, dams are made to divert the water and so prevent the inundation of the well.

While the ordinary wells, in their present condition, leave much to be desired, it is the mosque wells which call for the severest censure. The wells and the washing pools which they feed are inconceivably filthy. The water is not used for drinking purposes but for the ritual washing before prayers. Quite apart from their proved implication in the breeding of mosquitoes, the water is so foul and is changed so infrequently that they are potential sources of water-borne intestinal disease. The manner in which the ritual is performed has been outlined in another section of this report, and it needs only to be repeated that it includes the washing out of the mouth.

Recommendations

1. While it has been stated that no place was found with a water supply dangerously small, there can be no doubt that much benefit would accrue to the village by a development of the existing resources. There exist many places where grown could be brought under cultivation if wells were sunk to supply water for irrigation, but even the more direct benefit of procuring a more abundant water supply for domestic purposes calls attention to the need for teaching the people better and more efficient methods of sinking well shafts. This aspect has been dealt with fairly fully in a Water Report *(Messrs. Beeby, Thompson and others) and these present recommendations are concerned more particularly with the eradication of conditions conducive to ill-health.

Where the drinking water is drawn from rivers, the people must be encouraged to boil the water before use, being taught at the same time dangers of river pollution.

2. Well water. The avoidance of water contamination in these cases obviously lies in the improvement of the type of well. Wells are already in one sense the property of the community which they serve, but there needs to be inculcated a deeper sense of public ownership so that the maintenance becomes a communal responsibility. Regarded in this way the Aql of the village might be required to ensure that all play their part in maintaining the well in repair or in the provision of further wells where considered necessary.

Materials for building are at hand in most cases and it should be possible to devise a standard pattern capable of preventing the entrance into the well of animal droppings, sand or other infected material. Covered-in cement wells such as those in El Waht would be excellent but are likely to be too expensive for most village communities. Nevertheless wells of a simpler but almost equally effective character could be constructed. Troughs for animals and for the washing of clothes should be provided at a safe distance from all wells.

3. The mosque wells. Early steps should be taken to effect an improvement in these. Approach to this problem lies in obtaining the co-operation of the Sultans, local Sheikhs and Aqls. Conservatism is so great in the matter of religious observances that it is only by convincing the leaders of the dangers inherent in the practice of using the well water for washing that any improvement can be hoped for. The imams (mosque keepers) must be encouraged to change the water at least fortnightly.

* See footnote on page 119

CHAPTER IV

MEDICAL SERVICES IN THE WESTERN ADEN PROTECTORATE

History

In the introduction to this report it has already been pointed out that there were no medical services in the Protectorate prior to 1926.

The stimulus which led to action being taken in 1926 came from a report submitted to Aden Government by Lieutenant Colonel H. C. LAKE on his return from a tour of the Lower and Upper Yafa'i countries in 1925.

This was the first journey which had been undertaken in the Aden Protectorate for a number of years and during it Colonel Lake was impressed by the number of patients coming to him for advice. In his report he recommended the training, in Aden, of suitable young Protectorate men as dispensers.

In 1927 Dr. E. M. McKINNEY of the Keith Falconer Hospital of the Church of Scotland Mission at Sheikh Othman was approached with a request that the Mission Hospital should undertake the training of tribal dispensers. In the same year the foundation of the present tribal dispensers' training scheme was laid.

For some years this scheme remained in rather a nebulous state and it was not until 1934 that it was put on a proper footing. Dr. McKinney retired from the Mission at Sheikh Othman in 1927 and it fell to one of us to co-operate with Government in the further evolution of the plan.

Roughly the scheme meant that each tribal area in the Protectorate was encouraged in turn to send two candidates for training. These lived in Sheikh Othman for the three months of their course. They were fed and housed at Government expense and trained by the medical and nursing staff of the Mission Hospital.

The training in such a short period was of course very elementary. It had three main aims:-

(i) the treatment of wounds, ulcers etc., i.e. the use of dressings and a sense of asepsis,

(ii) the recognition of the main diseases of the area including malaria, bronchitis, dysentery etc., i.e. the use of simple drugs,

(iii) the recognition of conditions needing removal to hospital, e.g. bilharziasis, stone in the bladder etc.

The actual programme of the course is given in Appendix V.

Each candidate who passed his examination and was deemed worthy of trust was then given a free supply of dressings and drugs and was sent back to his local ruler with a request that the ruler give him a building for a dispensary. These dispensers were expected to make their living from their new profession and were allowed to buy replacements of their medical stores at half price from Aden Government.

Later modifications of the original plan were introduced and worked out in co-operation with various officers of Aden Government, Lieutenant Colonel H. C. LAKE, Mr. R. S. Champion, Mr. W. H. Ingrams and Captain (now Major) B. W. Seager.

The most important of the modifications were:

(i) the payment of a monthly wage to the dispensers. This was Rs. 8/- per month rising annually by increments of one rupee to a maximum of Rs. 15/-,

(ii) the introduction of advanced and revision courses at regular intervals,

(iii) the drawing up of a scheme for inspecting the dispensaries at least once a year.

The dispensaries actually examined under this scheme were Dhala', Shugra and Huseimir, but plans were made for other inspections which were never carried out because this part of the scheme had to be abandoned after the establishment of the British Medical Mission in San'a.

The training and inspecting was in the hands of the Mission staff and in fact it was upon one of us (Dr. Petrie) that the duty of inspecting these dispensaries fell.

In 1936, just as the scheme was developing, the Imam of San'a asked the Aden Government for a British doctor and lady doctor to do medical work at San'a in His Yemeni Majesty's hospital there. The Government of Aden asked Mrs. Petrie (who is also a qualified medical practitioner) to accept this appointment along with her husband. They agreed and were seconded from the Mission for the purpose. This unavoidably left the Mission short-handed and the visitation of the dispensaries has since been in abeyance.

One of the great faults of the present scheme has been lack of adequate supervision, but it will be seen from the above that that lack was not an inherent fault of the scheme but arose out of special circumstances.

Such visits as were made to the tribal dispensaries were greatly appreciated - as much by the local rulers and their people as by the dispensers themselves. The rulers in every case acted host to the visitor and opportunity was taken to solicit their fullest co-operation in the scheme and, in particular, their assistance for the dispenser.

The prestige of the dispenser was heightened by these visits and every opportunity was taken to treat him as a colleague in whom the people might have confidence.

There is no doubt in our opinion that the lack of these visits has led to a loss of enthusiasm and a general slackness on the part of the dispensers or that adequate visiting would remedy these defects.

In July 1939 Dr. C. H. HOWAT, the Acting Senior Medical Officer submitted a scheme for the training of Medical Sub-staff at the Civil Hospital, Aden. It was then proposed that a training centre be set up there to include the training of tribal dispensers.

An interesting correspondence took place between the Educational Officer and the Acting Senior Medical Officer with a view to exploring the possibilities of recruiting educated boys for the Protectorate (and other) medical service. The question of persuading some of the students from the Protectorate, who are educated at the College for the Sons of Chiefs, to take up this work was considered and the Educational Officer gave it as his opinion that "many parents of the class who send their sons to this College may not wish their sons to work during the training period in the town of Aden exposed to the evil influences which they believe it, perhaps with some justification, to contain".

Owing to the war the major scheme was postponed but the transfer of the training of the Tribal Dressers from the Mission Hospital to the Civil Hospital was carried through.

In his letter on the subject Dr. C. H. Howat, Acting Senior Medical Officer, wrote "the major scheme for medical education having been suspended for the duration of the war this department" (i.e. the Aden Medical Department and in effect the Civil Hospital) "can now undertake refresher courses for dressers already employed in the Protectorate".

It is to be emphasised that the training was only to be for those already employed and only "refresher courses" were to be given. The training of new recruits was to be stopped and the more advanced training of those already employed was not then envisaged.

About that same time a list of dispensers working in the Protectorate was prepared. It shows that then 15 dispensers were working in 10 dispensaries in 7 tribal areas as follows:-

Upper Yafa' (5 dispensers, 3 dispensaries). Amiri (4 dispensers,
Lower " (1 dispenser, 1 dispensary). 2 dispensaries.)
Audhali (2 dispensers, 1 dispensary). Fadhli (1 dispenser,
Haushabi (1 dispenser, 1 dispensary). 1 dispensary.)
Subeihi (1 dispenser,
1 dispensary.)

Of the ten dispensaries 6 have never been inspected. These 6 employ 10 of the 15 listed dispensers.

A footnote to this report states that the Beihan dispensary had been closed because the dispenser had gone to be a wireless operator.

The position in 1942

The present position of the Protectorate dispensary scheme is well outlined by the acting Chief Secretary to the Government of Aden in a memorandum dated 11th April 1942, No. 586/40/3211 to the British Agent, Eastern Aden Protectorate.

Aden in a memorandum dated 11th April 1942, No. 586/40/3211
to the British Agent, Eastern Aden Protectorate

THE SECRETARIAT,
ADEN.
11th APRIL, 1942

The letter is here quoted in full

Tribal Dispensers Conditions of Service

I am directed to refer to the request made in your memorandum No, 69 of the 29th of January and to append details of Tribal Dispensers Service Conditions.

2. Dispensers are appointed by arrangement between the British Agent and the appropriate representative of the Aden Protectorate Local Government concerned. In view of the fact that Tribal Dispensers are not in the ordinary sense of the

term employees of either the Aden, or of His Majesty's Government, it is impossible to lay down precise service conditions for them. The position is that His Majesty's Government have agreed to assist in providing medical training, a fixed contribution towards salary, and, also, facilities for procuring medical supplies, to the servants of Local Aden Protectorate Governments for so long as the British Agent in consultation with the Senior Medical Officer consider that the "Dispensary" scheme is not subject to abuses. The Local Aden Protectorate Government is expected to give further assistance to its servants on a basis appropriate to its particular needs and resources.

3. Tribal Dispensers are now entitled to the following assistance from His Majesty's Government:-

Salary. Rs. 10 x 1 x 15 by annual increments. Payable from the date a selected candidate begins his first course of instruction.

War Allowance. At approved rates.

Aden Allowance. As .12 per diem. Payable while Dispensers are taking courses of instruction in Aden Colony under the direction of the Senior Medical Officer. This allowance is intended to off-set the high cost of living in the Colony by enabling Dispensers to obtain suitable living accommodation. When the new hostel in the Crater is completed, then Dispensers will be expected to make use of it and this allowance will lapse.

Drugs and Equipment. On completion of his first course of instruction a Dispenser may be provided by the Senior Medical Officer with a free issue of essential drugs and equipment. This charge will be fully borne by Protectorate Funds. Afterwards the Dispenser may indent for his requirements to the Senior Medical Officer through the British Agent. The Senior Medical Officer will arrange at his discretion for the indent to be completed, after which the British Agent will debit half the cost of the consignment to Protectorate Funds and collect the remaining half from the Dispenser for crediting to the Colonial Office Deposit Account.

Supervision and Administration. For administrative purposes Tribal Dispensers form a part of their Local Aden Protectorate Government Establishment and are subject to tribal discipline. Political Officers on tour will find it convenient to exercise some supervision of the activities of Dispensers in collaboration with the Local Authorities. If it is apparent that the scheme has broken down in any particular area, then the British Agent may wish to make special recommendations to suit local conditions or to advise that the scheme be discontinued in the area concerned.

4. In conclusion it should be borne in mind that the aim of the Tribal Dispensary Scheme is the ultimate establishment of self-supporting medical services within the confines of territories whose Rulers are in Treaty Relations with His Majesty's Government. Protectorate Rulers should be reminded of this aspect and encouraged to co-operate with the British Agent in effecting this end. It would, for example, possibly be desirable for an increasing proportion of the cost of drugs and equipment to be charged to the central funds of the more advanced Protectorate Administrations, and, even the poorest areas may be encouraged to contribute towards the salaries of their Dispensers as well as providing them with simple accommodation for medical work.

5. Copies of this letter have been sent to the Senior Medical Officer and to the British Agent, Western Aden Protectorate, for information and record.

(Signed) J. A. JOY,
Ag. Chief Secretary
to the Government.

It seems almost unnecessary to comment that the same pitiable rates of pay and hard terms of drug replacement are still to be found in 1942 as have been unfavourably commented on all the way through. In spite of the report made in November 1941 and plans made early in 1942 it is again the case in Autumn 1942 that "no systematic instruction can at present be given at the Civil Hospital" but practical experience is given in the wards.

In August 1942 Political Officers of the various areas were asked to report on the working of the dispensary scheme in their areas. The following is a selection from their reports:

Beihan:- The dispensary is still closed but the Political Officer says that the trained man from this area who has gone off to be a W/T operator had "special aptitude for his work" as a dispenser. He strongly urges the need for fully trained doctors to work in the Protectorate.

Dhala' (Amiri)

"Those persons able to do so subscribe small sums for their medicines but as these, according to the dispenser, form the minority of patients attending, the income derived from this source is negligible.

Drugs, obtained through the Senior Medical Officer, are supplied at half cost price and have to be paid for by the dispenser who uses the subscriptions received for this purpose and pays the difference from his own pocket.

His salary from Government is Rs. 17/- per month and he receives in addition an allowance of 1¾ lbs. of grain daily from the Amir.

He complains that he is unable to live and also purchase drugs etc. from this small income and it is for this reason that he engages in trade ------ .

The dispensary is conveniently situated on the outskirts of Dhala' town in a building belonging to the Amir and it is clean and well kept inside. Drugs are stored neatly in cupboards ------ .

The drawback to its successful working is the old question of finance and I regret that there again I am lacking in ideas.

The obvious solution in theory is for all patients to pay the cost of the drugs used on their behalf but in practice this is impossible as the majority of Amiri subjects are poverty stricken.

I would suggest that it would be better if treatment was given free to all comers and the cost of the drugs paid direct by the Amir to the Senior Medical Officer".

Shuqra (Fadhli)

He reports a general slackness, a lack of confidence in the dispenser and that the Sultan uses the dispenser as a Tax Collector because he is the only man he can trust. He recommends:-

(i) regular visiting of the dispensary by a Medical Officer.
(ii) better equipment etc. tables and wash basins for the dispensary.
(iii) a visitor's book for comments by visiting Medical Officers and others.
(iv) that the hours of attendance be clearly defined.
(v) that the dispenser be encouraged to visit neighbouring villages and have his travelling and other expenses paid.
(vi) that the dispensers' salaries be raised.
(vii) that all treatment be given free to the public and that if half the cost of the medicine must be paid it be met by the local Sultan and not by the dispenser.

In the margin of this report the officer receiving it has written opposite a number of the suggestions the mournful chorus "But who is to pay ?" ! ! To this the Political Officer has replied "His Majesty's Government in the first instance" and when the scheme is a going concern invite each Sultan to contribute a lump sum each year.

After this the Political Officer approached the Sultan on the matter and has to record "He said he was indifferent whether we closed down the dispensaries altogether. I consider that His Majesty's Government alone will have to improve matters."

At the same time as these reports were asked for a new list of dispensers in employ and dispensaries open was called for. It differs from the earlier statement only in the fact that two dispensers are shown for the Fadhli country instead of one.

Finally, before leaving the history and present position of the Medical Services in the Western Aden Protectorate it may be of interest to note that in his quarterly report to the British Council, Colonel M. C. Lake, C.M.G., who is now the Council's Representative in Arabia and the Persian Gulf, recommended that the British Council give "assistance towards medical development in the Protectorate".

Criticisms of the present scheme:-

The aim: This is given as "the ultimate establishment of self supporting medical services within" each tribal area.

Provided very heavy emphasis is placed on the word "ultimate" there can be no objection to this but it should be appreciated that the attitude of the Fadhli Sultan quoted above is typical and a really sound working scheme will need to be well under way before we can expect the financial backing of local rulers. The best we can hope for in the initial stages is their friendly interest and permission to train their men, establish centres and supervise work in their areas.

The training. 1. The curriculum too has been too short. The training of illiterate or almost illiterate boys should probably be much more gradual.

2. The outlook has been too narrow. The treatment of minor ailments may be a useful service to render to a community but the present survey shows that the great need in the Protectorate is education in healthy living. Much could be done to prevent disease by giving the old dispensary idea a very secondary place and concentrating more on Health Centres with well trained health orderlies capable of disseminating effective propaganda and initiating health schemes.

3. It has been difficult to arrange for proper training in Aden. The Civil Hospital has kept up refresher courses but has had little time to give regular training. The Mission Hospital provided regular lecture courses, lecture demonstrations, and supervised practical work but could not give adequate supervision to the work in the tribal areas.

The trainees:- The men available are selected by the local Sultan. Those so far sent were in many cases illiterate and in nearly all other cases they could just read and write their own language - in no case had they any knowledge of English.

So far it has not been thought likely that literate or more highly educated boys from the Aden schools would be willing to go out as dressers to the tribal areas and it is doubtful if they would be accepted if they did go.

I do not think any good purpose will be served by condemning the present men for lack of enthusiasm. On the contrary in some cases, as at Dhala', they seem to have carried on under difficult conditions as well as they can ever be expected to do without the encouragement of regular supervision.

The finance:- The remuneration offered to trainees is much too small. A tribesman, who may enlist in the Government Guards and without any previous training gets 30 Rupees per month, is not likely to be attracted to the work of dispenser.

A man capable of becoming a W/T operator and earning 40 to 80 Rs. per month is even less likely to be satisfied, while to suggest that educated Aden boys, who can command 80 to 100 Rupees per month in their own town, should join a service in a "foreign country" which offers 10 to 15 Rupees is, shall we say, naive.

It was unfortunate that the dressers were encouraged to charge fees. In a primitive people, when dispensers may charge fees, the poor are likely to be neglected and the rich unnecessarily treated. The ordinary tribesman is very poor indeed and the rich are few and far between, so that it is not surprising that dispensers have had to take other jobs - wireless operator, merchant and tax collector have been quoted.

The onus of paying half the cost of drugs, which even now they are expected on most occasions to give away free, is much too heavy to put upon the dispensers.

The supervision. This has been so completely inadequate as to be almost non-existent for the past six years. At the same time these few dispensaries - Dhala', Museimir and Shuqra - which were visited at their inception seem today to be the best of rather a poor lot.

The Audhali dispensary has been unfavourably reported on by a recent visitor, the one at Beihan is closed and there is no news at all of those at Yafa'i.

No scheme is likely to have much success unless it is adequately supervised.

The distribution. It was anticipated that this report would criticise the distribution of the present dispensaries and suggest other sites. There is however very little criticism to offer under this head - the Audhali, Beihani and Yafa'i areas were of course not visited. A number of other places are sufficiently densely populated to justify the establishment of a centre e,g. Abyan, Jebel Jehaf, another in the Wadi Ma'adin district and perhaps one in Wadi Timnan.

Experience in other areas

Before proceeding to recommendations for a Protectorate Medical Service for the Western Aden Protectorate it may be of interest to give a brief statement of notes taken from workers on similar schemes in neighbouring territories.

During a visit to Abyssinia and Somaliland the opportunity was taken to visit various training centres and discuss the training of tribal dressers with various Medical Officers and Nursing Sisters. To them our thanks are due for the following notes.

The Sudan Medical Service

1. Before being entered for training the boys are expected to be educated in Arabic and to know elementary English.

2. Dressers before being sent out graduate through hospital where they have spent some time as hospital helpers.

3. It is recommended that the training centre should be away from any city as it is thought that city life upsets the tribesman.

4. Tribal Dressers are paid better than the Police or other Government servants who can do their duties uneducated.

5. Drugs are supplied free to the tribal area and the dressers give their services free.

6. Continued supervision is necessary - an example of what can happen was given. "Syringes have recently been withdrawn because Tribal Dressers were found giving injections for fees. The injections in some cases were doses of Nile water.!"

Abyssinia

1. Grade of education very variable but knowledge of English almost nil.

2. Are taught elementary English.

3. Can take temperatures, keep charts and do ward work in less than 6 months.

4. Sisters find Trowell the best book to train from. (Handbook for dressers and nurses:- H. C. Trowell, M.D., M.R.C.P., Sheldon Press, Northumberland Avenue, London, W.C.2.). See also Appendix VIII.

British Somaliland

Here the training unit at Hargeisa was visited. The Medical Officer, Captain Audy, there had worked out a teaching policy and a curriculum which have the great merit of simplicity. We append his memoranda for information and take this opportunity of expressing thanks for his help. (See appendix VI).

In addition to the points made in his memoranda Captain Audy made the following other points in conversation:-

(1) To begin with discover the two or three problems of a district and concentrate the training round these only.
(2) Malpraxis and slack work always creep in when there is no personal supervision, by the Medical Officer.
(3) The help of a sister tutor is essential in training.
(4) The doctor must have a mobile ambulance and inspect the outstations regularly. The very useful motor he showed was a 30 cwt. Chevrolet with 4-wheel drive, auxiliary sand gears and a steel cable wound on a drum and driven when necessary by the engine of the car. With this he was able to pull himself or a second car out of mud or sand drifts.
(5) Three grades of trainees were turned out:

The first received Rs. 20 per month while training and 24 on "graduating".

The second was called the "Dresser" grade and was paid Rs. 30-2-40 per month.

A few went to the "Compounder" grade and were paid Rs. 70-5-200.

RECOMMENDATIONS:-

The whole work of the survey and the plans now to be outlined are based on the opinion voiced by Sir Bernard REILLY then Governor of Aden, in his despatch of March 1939 to the Right Honourable Malcolm Mac Donald, then His Majesty's Principal Secretary of State for the Colonies. Sir Bernard wrote:-

"I am of opinion that, with the more forward policy which His Majesty's Government is now adopting with regard to the Aden Protectorate the time is ripe to give its people the benefit of a better medical organisation."

There has more recently been talk of delaying any forward policy in the Aden Protectorate for the present. It has nevertheless been possible to go ahead with progressive schemes in agriculture and it should surely be possible to achieve some progress in medicine even if a general forward policy is being delayed. That such an advance in the medical field would be welcomed by the people and their rulers is sure and the propaganda value of such an advance will not be disputed. The

conduct of the work could well be entrusted to the Mission which has always co-operated with Government in this field; and as well as other advantages this would avoid involving any Government department in a policy which would be running ahead of other departments.

The immediate aim. The immediate aim of the scheme to be suggested would be the establishment in the Western Protectorate of Medical Services to deal with the problems of each area through trained orderlies recruited from the areas and supervised by a Medical Officer.

Centres will be suggested for each area, planned to help the people to healthy living. All suggestions of financial contribution from the local rulers are recommended to be postponed until the popularity of the scheme is assured. After that the ultimate aim of a "self supporting service" may be raised.

The outstanding requirements. In various communications prior to the survey Dr. J. C. R. BUCHANAN, Senior Medical Officer, Aden, named adequate training and proper supervision as the two main requisites of any Protectorate Medical Scheme. Further experience has served only to underline these. The whole success of any scheme of the nature visualised will depend upon the thoroughness and appropriateness of the training and on the regularity and adequacy of the supervision.

Suggestions were at one time made of securing the services of an Arab Instructor but, apart from the great difficulty in finding a suitable man, the writers believe that much better results would be got if the instructor were a Medical Officer and if his efforts were backed by help from a Sister Tutor. It is also recommended that those who do the training should also do the inspecting of the outstations.

The Training. The Mission Hospital provided a degree of training but could not keep up adequate supervision. The Civil Hospital on the other hand did not really undertake to do anything but provide facilities for refresher courses and with its present limited staff could not undertake the more serious training of Protectorate dressers nor their supervision when trained.

The present argument then is that the Medical needs of the Western Protectorate can best be met by a properly equipped training centre with a staff primarily concerned with the training of men to work in their tribal areas and with the regular and adequate supervision of the work in those areas. This dual purpose of the staff - training and inspection - underlies the whole scheme now being suggested.

From the findings earlier in this report it must have become clear that the great need of the Protectorate which Medical Services can supply is education in healthy living. I submit therefore that the new centres should be Health Centres rather than Tribal Dispensaries.

That is to say centres from which effective health propaganda can emanate rather than places for dressing ulcers and issuing purgatives.

The Health Training Centre

The aim of the Training Centre will be to train men from the tribal areas to meet the elementary health needs of their districts and to equip them to manage Tribal Health Centres there.

Site of the Training Centre. It will be obvious that a centre in a tribal area where rubbish heaps can be inspected, wells visited, nutrition studied and anopheline larvae found will be much more useful for demonstration purposes than a Training Centre housed in Aden.

These advantages will be as great to the training staff as to the trainees, for they will see the problems they are up against and learn in actual experience and by actual experiment the best methods of dealing with them.

Add to this the argument from the Sudan that town life upsets the tribesman - an argument which our own experience verifies - and the comment of the Education Officer on the "evil influences which" the better class up country Arabs "believe it (Aden), perhaps with some justification, to contain" and the case for the Health Training Centre being in a tribal area is very strong. (See Appendix VIII).

The area which at once suggests itself is the Dhala' plateau. The Amir of Dhala' has on more than one occasion personally approached various doctors about the establishing of medical work in his area: he is friendly to Aden Government and Dhala is reasonably approachable by car from Aden. The plateau is fairly healthy and the staff of the Training Centre would not be unduly exposed to risk. Short excursions could be arranged to places within easy reach where the intermediate hosts of malaria and bilharziasis could be found and from those places illustrative cases of these diseases could be studied. Wells, rubbish heaps and other illustrative material are at hand.

The plan of the Centre. The buildings would include a hostel, a hospital and quarters for the permanent staff; both Arab and foreign.

(a) A hostel to house a dozen students at a time. It is suggested that in planning the hostel, sanitation and housing suitable for use in tribal areas should be used so that the actual hostel in which the trainees live may illustrate what they have come to learn.

The hostel should encourage the community's spirit and for that reason a common room, reasonable facilities for Moslem prayer and an open space for recreation should be provided.

(b) A hospital. This should be as small as is compatible with teaching needs - probably about thirty beds.

It is suggested that the purpose of this hospital will not primarily be to treat the hernias, remove the piles or even cure the cataracts of the local population but to run a general teaching out-patient department and an illustrative tropical medicine in-patient department. (The usefulness of the out-patient training is underlined by Dr. Trowell - see Appendix VI).

Cases, other than emergencies, needing surgical or specialised treatment outside the scope of the trainees should be sent on to Aden.

In the out-patient department trainees would take turns on responsible duty and would learn to pick out cases beyond their scope and send them on. In the in-patient department they would be given experience in the kind of treatment they could usefully do in their own area, but the material here would also be used to illustrate more general principles and the students' aim and outlook would never be allowed to limit themselves to the treatment of sick people.

(c) Quarters for the permanent Staff. These should be so planned that, while all who go there have adequate privacy, the whole centre - both Arab and foreign - both students and teachers - is one community.

(d) Other equipment. This should include a lighting set, a water pumping system, suitable motor transport and tentage.

With regard to the first two items a recent report* on the Water Problem of the Western Aden Protectorate draws attention to a waterfall near Dhala' which could be used to run a hydro-electric plant and which at the same time could probably give an adequate water supply for the Centre.

With regard to motor transport the 30 cwt. Chevrolet described as in use in British Somaliland should be kept in mind.

(e) The foreign trained staff. The term "foreign trained" is used rather than "European" to include the possibility of Arab medical graduates or nursing sisters. The minimum number might be three but the optimum would be five - two doctors, two sisters and one trained dispenser who might also be the business manager. This staff should be part of a team with their Arab staff and their students. They should be prepared to give their contribution to the community, living on the same campus, taking responsibility, both by precept and example, for character building and esprit de corps as well as training in the more obvious subject of the curriculum.

This staff would need to be chosen with some care for its willingness:

(i) to devote a period of years to South Arabia and to learn Arabic.

(ii) to live in the Protectorate and to travel round inspecting the Tribal Health Centres.

(iii) to teach with enthusiasm and patience.

I think a properly selected mission staff would be the most suitable, and would suggest that the mission which co-operated with Government to run the previous unsatisfactory scheme be asked to undertake the new scheme, whether on the lines here outlined, or others.

Sir Bernard Reilly's despatch of March 1939, already quoted, suggested that the "whole scheme be under the supervision of an officer of the Colonial Medical Service and that the Protectorate Medical Services would be linked with the medical services of the Colony and the personnel would in due course be interchangeable".

This has obvious administrative advantages and I think these could be preserved by an extension of the co-operation between Government and the Mission which existed when the old scheme was at its best. The whole could be under the general supervision of the Senior Medical Officer, Aden.

It may also be urged that the Mission might reasonably be expected to give more service for whatever grant is voted. The normal emoluments of a medical missionary are just half those of a Colonial Medical Service Officer.

(f) The Arab Staff. It is in this capacity that well educated, hospital-trained Aden boys would be of most use in the first instance. Probably four or five such boys would be needed.

* See footnote on page 119.

THE CURRICULUM

Elementary education. To begin with, the Centre must be prepared to accept students whose earlier education has been very slight indeed. For that reason some provision will need to be made for the teaching of reading and writing in Arabic, and of elementary arithmetic. Also - if thought wise - some provision might be made for the teaching of Basic English. It is not proposed to employ any extra staff for this purpose. The permanent staff will, in any case, need an interpreter and he could be expected to run elementary Arabic classes at suitable times. The English could be taught by the doctors.

Special education. This would include as much as is necessary of the subjects of Anatomy, Physiology, Pharmacy, Bacteriology, Medicine and Surgery in elementary forms but as soon as possible teaching would go on to such subjects as Nutrition, Sanitation, Housing, Water supply, Mosquito control, Bilharzia control, Trachoma, Vaccination and the dangers of Qat addiction. In all cases the training should be accompanied by practical work, from the practical running of an out-patient department and the nursing of the sick, to oiling mosquito breeding places and planning refuse disposal. Excursions to neighbouring villages which illustrate the various subjects should be planned as a regular part of the course.

General education. It cannot be too strongly urged that the great difficulty at present is to find Arabs who are willing to care for people, or do any form of work, because of the general good it will do. The Arab is willing enough to help a personal friend and keen enough to undertake a job which is obviously going to benefit himself. There is then a real need for training aimed at character building. The trainee needs to be given a sense of the dignity of his job and an appreciation of its importance in the welfare of his people. He must learn to care for others from motives other than purely selfish ones. He must learn to take responsibility, show initiative and take a proper pride in his job.

It is clearly over-optimistic to expect our students to develop these qualities just because they have attended a series of medical lectures in Aden, been turned loose in Aden market or been housed at Government expense in a room over an Aden coffee shop. It is equally over-pessimistic to say that because they do not turn out too well under these conditions the whole scheme should be abandoned. What should be abandoned is an impersonal attitude in training and what should be encouraged is the inclusion of character building in the curriculum.

The duration of the course will need to be discovered by experience, but we suggest that to begin with all the present dispensers be brought into the new centre for six months, and that the initial plan be three "terms" each lasting six months, and spread over three years. Each intervening six months would be spent at the Tribal Health Centres where the dispensers would be visited by the staff of the Training Centre.

Finance. It is one of the contentions of the present plan that up to now the financial arrangements of the Tribal Dispensaries have been a burden upon the dispensers and upon the local rulers, for the bearing of which they have so far seen little return.

Any scheme in an Arab territory which is burdened by financial responsibility at the outset is bound to be looked upon with disfavour. Therefore, a pre-requisite of the present scheme, in the early years at least, is that all financial burdens be borne from sources which make no demands upon the rulers, the dispensers or the people of the area. Later, changes may be made when the scheme has become sufficiently popular and the form these changes take will depend upon the circumstances at the time, but to begin with the Medical Services should be free so far as the area is concerned.

The next point is that this service must offer the trainees a satisfactory career. At the moment I know of no job whatsoever, other than that of tribal dispenser, for which His Majesty's Government offers so meagre a salary as 8, 10 or 15 Rupees per month. It has been urged that at present this work is not worth any more but from the dispenser's point of view it is equally just to say that he does as much as he is paid to do and that to augment his pay he seeks other work. Nothing will be served by cheese-paring in this matter. Men who are justly dissatisfied with their wages do not work well. Given proper training and adequate supervision the inefficient and unsatisfactory can soon be weeded out.

Briefly, the proposals, so far as they concern finance are these:-

(i) that the pay of "graduates" should be higher than that of local police or other grades of Government employees who can do their job illiterate. The Somaliland scale appears to be reasonable, and Rs. 20 per month on joining the new scheme, rising to Rs. 25 on "graduating" with further promotion if merited later, might be the scale of the new scheme.

(ii) the services of trainees should be given to their areas free, and the ordinary drugs, dressings and equipment supplied free.

(iii) the Health Training Centre should be built, equipped, staffed and run without cost to the peoples of the Protectorate.

We believe the propaganda value of such a scheme would be vast and that the dividends in goodwill would make it worth while for His Majesty's Government to finance quite generously but if necessary other sources might be explored. (A rough financial estimate is appended). (Appendix VII).

THE TRIBAL HEALTH CENTRES

The building. A well lit, well ventilated room to be used as an office and treatment room. In most areas a roofed verandah would be sufficient as a waiting room. The whole should be inside its own stockade and should be reasonably near a good water supply. There should also be ample storage and cupboard space and a fireplace. With a little modification one of the houses of the villages would be suitable in most areas and in several the buildings at present in use as dispensaries could be suitably modified at little cost.

A second room could be provided if it were thought advisable to accommodate occasional in-patients. The whole centre, i.e. including Dispensers' houses, should be so built as to be a model in sanitation and housing to the whole district.

The staff. The staff at each centre should be two trained health orderlies. They should not be encouraged to employ subordinate staff (sweepers etc.) but should learn how to keep their centre tidy and clean without outside help. It has been suggested that where two work together in a centre one becomes a subordinate, but it should be possible to alternate duties so that each develops his own initiative.

Their houses should be near the centre, and, wherever possible, adjacent to it.

The present dispensers should be given the first chance of these posts, but new recruits should be sought to replace any who are shown to be unsatisfactory after fair trial.

The equipment. The equipment should be such as the "graduate" is thoroughly familiar with and adequate to his needs. The ordinary office furniture of a table, chairs and stationery, simple surgical equipment including bowls, basins, jugs, instrument trays, drugs and dressings as supplied to the present dispensaries should be provided. This part of the work could be taken over from the present scheme without much change in the first instance.

Later as the men become more efficient the question of providing a microscope might be considered.

Functions. 1. To provide a centre at which the people of the district may obtain help and advice on all subjects relating to health. For this purpose regular known hours should be kept at each centre, when treatments would normally be carried out.

2. To co-operate with the local ruler in bettering the health of the community. For this purpose frequent inspection of the local wells, rubbish heaps etc. must be made by the orderlies, and continuous friendly contact maintained with the ruler with the purpose of arousing his intelligent interest in Public Health.

3. To provide the people of the area with accurate, simple information on sanitation, nutrition, mosquito control and kindred subjects. For this purpose the local ruler might arrange that at regular intervals, say once a month on market days, talks be given by the orderlies in some public place.

4. To provide the Training Centre with information regarding the local health problems. For this purpose reports would be called for from each tribal centre from time to time, the specific subject of the report being laid down by the Centre.

5. To carry out any health measures authorised from time to time by the local ruler, such as vaccination, oiling of pools etc.

In all these things the health orderlies must use tact so that they keep on the friendliest terms with their rulers, whose subjects they are, and they must not arouse the antagonism of the people by too rapid introduction of new ideas.

Supervision. Each tribal Health Centre should be visited by a Medical Officer from the Training Centre at least once a year. The visiting officer would stay in the district for at least a week. He would see the actual running of the centre, have talks with the ruler, do all he could to further the proper prestige of the orderly, discuss with him, and later with the ruler, the local

health problems, and inspect the district with a view to increasing his own knowledge of these problems. The knowledge accumulated on these visits should be correlated from time to time so that a coherent picture of the health of the Protectorate be filled in more accurately and kept up to date. Specimens of mosquitoes, snails and other matters of interest should be collected and a teaching museum built up, from the materials, at the Training Centre.

To facilitate this supervision it has already been suggested that six months of the year be devoted to training and the next six months to inspection.

It will be clear that these inspections can be more frequent, more prolonged, and therefore more effective, if divided between two medical officers. During the inspecting months the small hospital at the training centre would be run on a skeleton staff or would be closed down except as a base for these expeditions.

SUMMARY

An account of the history and present position of Medical Services in the Western Aden Protectorate is given: this is followed by some criticisms of the scheme as it now is - these criticisms have to do mainly with training, supervision and finance: some notes are given from other areas where similar work is being done. Finally, certain recommendations are made for the establishing of Protectorate Medical Services. In these it is suggested that financial responsibility be completely removed from the people of the area for the initial period of the scheme; that the emphasis of training be on healthy living and the establishment of Health Centres; that the work is especially suited to a Mission staff willing to devote a period of years to Arabic and live in the Protectorate more or less isolated from other Europeans, and that this would be more economical. Suggestions are made for the establishing of a Health Training Centre in the Protectorate and Tribal Health Centres to replace the Tribal Dispensaries. A scheme of training and supervision is outlined.

APPENDIX I

The forms used on the survey: 1. - The form used for the examination of the people. 1A. - Malaria. 1B. - Bilharzia. 2. - Nutrition. 3. - Sanitation. 4. - Water and 5. - Housing.

Form M.S.1.

SURVEY held at Date

Index No. Name Race

INTERROGATION

Past History:

Occupation:

ABODE: Type Size Occupants

Intelligence: Literacy

DIET: Main foodstuff No. of meals daily

Meat Fish Milk Salt Fruit

Green vegetables Comment

For Adult Women: Marital State and duration of marriage.

Children: Born Alive

Still Living Ages at death

EXAMINATION

CLEANLINESS: Head Body Clothes

Physique and general nutrition:

Rickets Other signs of defective diet

Teeth and Gums:

EYES: V/Ac. R. V/Ac. L. Trachoma

Other eye conditions

Heart Lungs

Condition of bones:

Deformities:

Skin: Smallpox

Spleen:

Comment on Interrogation and Examination:

LABORATORY FINDINGS

Blood: Hb %

Type of Malaria Parasite:

Any other Parasites

Comment

Urine: General.

Microscopic

Stool: General.

Microscopic

REMARKS

Note: Any signs of Leprosy, Yemen Ulcer, Mycetoma, Syphilis 'Bejel', Dysentery, Relapsing Fever and Tuberculosis should be noted.

Form M.S.1.A.

Malarial Areas.

Date

MEDICAL SURVEY, WESTERN ADEN PROTECTORATE,

Survey held at

Economic Status of people ...	
Principal sources of livelihood ...	
Presence of immigrants ...	
General standard of nutrition ...	
Conditions of housing ...	
Communication with outside areas ...	
Use of quinine ...	
Species of mosquitoes breeding in the area.	Breeding places:- a. Temporary b. Permanent
Relative proportion of each if possible	Type of breeding place used by anopheline

Possibility of easy eradication of breeding places.

Form M.S.1.B.

59176-1

MEDICAL SURVEY, WESTERN ADEN PROTECTORATE, Bilharzial Areas.

Survey Held at ..... Date .....

Description or identification of local molluscs ...	
Characteristics of surroundings in which they are found ...	
Possibility of easy eradication of molluscs ...	
Preferability of attack on definitive host ...	

59176-1

Form M.S.2.

MEDICAL SURVEY, WESTERN ADEN PROTECTORATE, Nutrition.

Survey held at ..... Date .....

Standard of physique ...			
No. of meals per day ...		Times at which taken	
Principle foodstuff ...		Form in which used	Seasonal variation
Consumption of:- Meat ...		Quantity	
Fish ...		Quantity	
Milk ...		Quantity	
The use of common salt ...			
Nature of vegetable or fresh fruits used in dietary ...			
Additional food given to breast fed infants ...			
Feeding customs in connexion with infants from birth to age two ...			
Additional or different foods consumed by pregnant or nursing women ...			
Obvious signs of dietetic deficiency ...			
Particular ingredients lacking in dietary...			

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Form H.S.5.

MEDICAL SURVEY, WESTERN ADEN PROTECTORATE, Sanitation.

Survey held at ..... Date .....

A. REFUSE. Method of disposal of domestic dry refuse and of trade refuse	
B. EXCRETA. Provision for reception of excreta in private houses ...	
Final method of disposal of excreta ...	
Ratio between sanitary accommodation and numbers of persons living in these houses..	
Public conveniences ...	
Estimation of degree of nuisance and danger assuming from existing sanitary arrangements	

Form M.S.4.

59176-1

MEDICAL SURVEY WESTERN ADEN PROTECTORATE, Water Supply.

Survey held at ..... Date .....

Source of water supply ...	
Accessibility of source ...	
Protection afforded to source ...	
Existent contamination ...	
Possible future means of contamination ...	
Approximate requirements per head per day ...	
Approximate amount available per head per day ...	

59176-1

Form H.S.5.

MEDICAL SURVEY, WESTERN ADEN PROTECTORATE.

Housing.

Survey held at ..... Date .....

Estimated population ...					
Nature of village site ...					
General plan of village ...					
Material used in construction of houses ...					
Average number of rooms	Poor class		Average dimensions of sleeping quarters	Poor class	
	Wealthier class			Wealthier class	
Average number of persons occupying sleeping quarters	Poor class				
	Wealthier class				
Provision made for ventilation of sleeping quarters	Poor class				
	Wealthier class				
Presence of livestock in houses and nuisance resulting therefrom					

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APPENDIX II

REPORT ON VISIT TO LAHEJ 21st to 25th March 1940

This short visit was intended to supplement the surveys conducted by Dr. PETRIE and myself in the Abdali country in January 1940 as part of the Survey of the Western Aden Protectorate. On these occasions visits were paid to Haski and El Waht. Although both these villages, like Lahej, are watered by Wadi Tiban it was thought desirable to make a special survey of Lahej for two reasons:-

(1) Firstly, because it is the largest town in the Protectorate, having a population of roughly 12,000, which suggests that it has its own particular health problems.

(2) Secondly, because of the high incidence of malaria.

While useful information relating to the commoner diseases, nutrition and sanitation was compiled with the assistance of Dr. Gokhale, the A.M.O. at Lahej Dispensary, our efforts were mainly directed to a study of the conditions favouring the spread of malaria. It is with the latter that we propose to deal in this short report.

REPORT

In the course of the three working days a systematic visitation was made of possible mosquito breeding places as follows

1. Mosque wells and washing-places.
2. Public wells.
3. Water-pots, domestic and public drinking pots.
4. Standing water, refuse disposal receptacles and pools.

It should be stated at the outset that the survey would have been more valuable had it been conducted a month earlier, that is immediately after the rains. When rain occurs it comes early in the year, and during this time the potential breeding places in the town are increased, and moreover the irrigation channels are full and must be a source of danger. During our visit all irrigation channels in the immediate vicinity of Lahej were empty.

(1) Mosques. Special attention was paid to the wells and washing places within the precincts of the mosques as experience elsewhere in the Protectorate suggests that little attempt is made to keep these places clean, and ceremonial washing can certainly be deemed no more than ritualistic.

At the main mosque well one or two larval skins were found but continued search yielded no living larvae. All other mosques visited gave negative results. Despite this the wells cannot be said to be above suspicion and require constant supervision. The actual washing-places are, generally speaking, not likely to contain larvae as they are in regular use and are moreover, often befouled with urine and faeces, although the latter fact does not of course necessarily inhibit the development of the insect.

(2) Public wells. A tour of the wells proved more successful. From one of the smaller wells each draught of water secured one or two anopheline larvae. This well has a depth of 60 feet and fortunately, being small, serves only a small area. No other well revealed larvae, but anophelines were again found in one of the puddles formed at the side of a much frequented well. After breeding from the larval stage these latter were identified as A. gambiae, a malaria carrier.

(3) Water-pots. In various parts of the town large earthenware pots containing water have been placed for the convenience of the general public. In three cases they were found to contain thriving colonies of culicine larvae. Since the water in each pot appeared fresh and clean and the pot was covered with a wooden board, the assumption is that these water-pots are not emptied before being replenished.

Domestic water-pots showed evidence of the same lack of care, or ignorance. Of the eight houses inspected three had culicine larvae in the water-pots. The same routine appeared to have been followed here.

(4) Standing water etc. While the above is of sufficient importance for concern we feel inclined to view the method of waste and refuse disposal as constituting the greatest danger to health. Most of the houses use the "long drop" method of disposal of faeces although it differs in one important respect from that used in other parts of the Protectorate. In Lahej the excreta passes down an iron pipe from the upper room and is thus led into a cess-pit walled over with mud-brick. While we kept such places in mind as possible breeding places, especially after rain, we

were unable to investigate them, and assumed that generally it must be considered that the contents of these pits would either be too foul for breeding or would have insufficient water to allow of the development of the eggs. However urine and waste water is led away by a pipe also and is discharged either into an earthenware container or barrel or quite frequently into an open cess-pool. In two such places as the latter we discovered literally thousands of culicines breeding. It is these places that we stress as being of greatest danger. The water is not too foul for anophelines and as the pits lie within the shadow of the house and are constantly replenished and the beneficent effect of evaporation is never greater than the intake.

REPORT ON SANITATION - LAHEJ

Refuse disposal. Waste food and other materials appear to be disposed of in a very perfunctory way and through some refuse is deposited outside the town, certainly it is a great nuisance generally. The lanes and byways are dirty and ill kept, but actual rubbish heaps were only in evidence on the outskirts of the town.

Disposal of excreta. Some houses have the "long drop" system as seen elsewhere, the reception chamber being cleaned out periodically. Quite a large proportion of the houses have a modified type of "long drop" system. In these the faeces and presumably waste water pass down a pipe into a pit which to begin with is about 12 feet or more deep. This is covered in by a mudbrick structure having rather the appearance of a bee hive. Ventilation holes are made in this structure and, thus it may form a nidus for the breeding of flies. There did not appear to be much nuisance from smells but the area around these structures looked very foul.

Method of disposal of urine and waste water is not constant, but in many houses it was led down an iron pipe into an earthenware container or other receptacle. There was little evidence to show that these were emptied regularly. Indeed many of them were quite full and were allowed to overflow on to ground.

Other people made no attempt to collect this waste water and in two places noted specially, large pools had formed which were particularly offensive and in which Culicines were breeding in thousands.

Certain of the mosques showed an attempt at reasonable disposal. From the main mosque there was actually an underground tunnel for the waste water, urine and faeces, with an occasional manhole along its course. The channel ran to a soakage pit on the outskirts of the village.

In other mosques, the water merely passes down an underground channel to enter a soakage pit just outside the mosque building. In at least one case this channel passed close enough to the well to constitute a danger.

In general the conditions inside the mosques were very bad. The washing places were befouled with urine and faeces and the water used for ablution is certainly not changed daily.

Medical Report - Lahej

The prevalent diseases in Lahej are malaria, throat infections, eye conditions, ulcers, constipation and pulmonary tuberculosis.

Malaria is endemic and the spleen index is high. The parasites are often of the subtertian type besides the usual benign tertian. A small definite percentage of Quartan infection is also seen. The malarial incidence is high and accounts for many cases of anaemia.

Throat infections, viz., Pharyngitis, laryngitis, tonsillitis etc., are in my opinion very common and are due to the large amount of dust. A comparatively frequent affection of the gums is also seen.

This same dust probably favours the incidence of the large number of cases of conjunctivitis and trachoma; the latter is very common indeed.

Constipation is specially mentioned because it is very common and very obstinate.

Pulmonary tuberculosis, which is seen fairly frequently, is largely due to the excessive dust and throat infections, and is furthered by poverty and malarial anaemia.

Colitis very similar to dysentery is sometimes seen, but its incidence is low.

Regarding seasonal incidence, there is nothing particular except as regards malaria, which shows an increase during the months of November to February.

Proportion of immigrants is negligible. A considerable number of people pass through from Yemen to Aden and vice versa, but this cannot contribute to the incidence of disease locally. People from Aden staying in Lahej for a time may take malaria back with them.

Population of Lahej is roughly 12,000. It is mostly agricultural and falls mainly in two groups (1) the well-to-do, and (2) the poor. The middle class is small. No overcrowding can be said to occur in Lahej.

Average diet is rice, corn and fish. Meat about once a week, Vegetables and fruit seldom, a lot of coffee and frequently sour milk forms the rest of the diet. Milk as such is not much taken. This diet is generally insufficient in nutritive value, and vitamins. A lot of Qat is eaten, which does not favour good digestion.

Water-supply is derived from wells which are spread out and yield sufficient water. The water is drawn by hand and usually carried about in tins by water-carriers. Most of these wells are not built up sufficiently high above the general surface level, and their walls are not built in. They are exposed to subsoil as well as to surface contamination.

Sanitation is elementary. It has been improving but there is room for further improvement. The streets are urban and many of these as well as the lanes and byways are full of dust, refuse and odds and ends. The night-soil is disposed of at random by burying it in the ground at different places away from the town. Mosquitoes, Culex and Anopheles, as well as flies, are numerous.

Lahej affords medical facilities. It has had for nine years now a well equipped dispensary with a fully qualified doctor in charge, and the usual assistants. It is maintained by H.H. the Sultan of Lahej. Just over a year ago H.H. the Sultan had a man trained for sanitary work, and after training appointed him for the same. Latterly another man has been added; this augurs well for Lahej sanitation.

C.K. Gokhale M.B., B.S.

March, 1941

A.M.O. Lahej Dispensary

APPENDIX III

BILHARZIASIS IN SOUTH ARABIA

This infection has been recognised clinically for some years in South Arabia and has probably been endemic in the Yemen for centuries. It was not found, so far as is known, till 1931, when the eggs of S. mansoni were detected in a rectal tumour from an Arabian patient by an officer of the Royal Air Force Medical Service (Squadron Leader E. A. LUMLEY).

Distribution

Probably owing to the extremely arid climate, the disease tends to be very localised; so much so that an Arab with vesical or rectal symptoms coming from a known focus of infection is frequently and provisionally labelled as suffering from schistosomiasis and this assumption is almost invariably confirmed.

With the gradual development of the Protectorate, penetration by travellers, political and intelligence officers has followed, but has not afforded much opportunity for European infection.

Among Europeans it was unknown until April, 1935, when a small detachment of Royal Air Force men contracted the infection in the Wadi Tiban, an area until then free from suspicion, owing to the complete absence of the infection among the local inhabitants.

On the 4th and 5th March, 1935, twelve of a party of fifteen Royal Air Force men washed in the Wadi Tiban at Musaimir and at Al Anad respectively, and fifty days later the eggs of S. mansoni were found in one of the party, four of which were by then in hospital with intermittent gastro-intestinal symptons, eosinophilia, and mild fever. The rest of the party were promptly tested, and, in all, twelve were found with an eosinophilia, some with mild symptoms, some in apparently normal health; all were individuals who had washed in the Wadi on the occasion fifty days before. Three members of the party with a normal blood picture were subsequently found to have been those who did not wash in the wadi. Owing to the clinical similarity, the striking eosinophilia, and the clear history it was assumed that all had become infected and treatment was initiated. The assumption was justified in the prompt improvement of the patients.

Details of the distribution of the intermediate hosts, as far as are known, are given on the attached sketch map and are as follows:-

Planorbis and Bulinus at MUKIER/S, where the infection is unknown among the local inhabitants.

Bulinus at DH/LA, whence one case has been reported.

Planorbis and Bulinus at MUSEIMIR where the infection has only just been discovered and is unknown in the local population.

Onchomelania at Al Anad.

From this it is evident that the absence of obvious infection of the local inhabitants does not indicate the absence of danger to Europeans; that the intermediate hosts are widely spread in the Protectorate of Aden; and that the parasite seems to prefer Europeans and probably is subject to marked seasonal variation, being discharged into the waters when the snail ruptures, possibly in the Spring rains, when its food is on the increase.

(Signed) B. F. HAYTHORNTHWAITE,

Squadron Leader

APPENDIX IV

Royal Air Force,
Hospital Laboratory,
Aden.

8th April, 1940

Report on the Analysis of water received from

(1) El Kirsh (2) Huweimi

Sample:- 1 (El Kirsh):-

This water is clear and bright, odourless, normal in colour and neutral in reaction.

There is a high Free and Saline ammonia content but low chloride and nitrate content which would point to a recent animal pollution.

It is a hard water as evinced by the permanent hardness figure. Metals are absent.

On chemical examination the water is unfit for human consumption.

Sample:- 2 (Huweimi):-

This water is clear and bright, odourless, normal in colour and neutral in reaction.

The Free and Saline content is somewhat high. This together with a low Albuminoid Ammonia and high chloride would suggest that the water has contained organic matter presumably of animal origin but that it has become oxidised.

It is a hard water as demonstrated by the figures of the permanent hardness. Metals are absent.

On chemical grounds the water is unfit for human consumption.

A Bacteriolgical Examination was not carried out on either of the two samples as the water was not in a sterile container and was contaminated by insects and dust, also about 14 days had elapsed before receipt of samples.

(Signed)

Squadron Leader,
Officer in Charge,
R.A.F. Laboratory.

REPORT ON ANALYSIS OF SAMPLES OF WATER RECEIVED FROM R.A.F. STATION

Huweni collected at . hours on 23/3/40 from Dr. P.W.R. Petrie

PHYSICAL CHARACTERS:	-	Appearance	- clear and bright
		Colour	- normal
		Odour	- nil.

CHEMICAL CHARACTERS:

Reaction	Neutral	
Free and saline ammonia	0.0062	parts per 100,000
Albuminoid ammonia	0.0022	" " "
Chlorine	32	" " "
N. as Nitrates	Absent	" " "
Total solids	40	" " "
1. Volatile	11	" " "
2. Fixed	29	" " "
On ignition	. -	" " "
Total hardness	21	" " "
1. Temporary	2	" " "
2. Permanent	19	" " "
Poisonous metals	Nil	

REPORT ON ANALYSIS OF SAMPLES OF WATER RECEIVED FROM R.A.F. STATION,

EL KIRSH collected at hours on 23/3/40 from Dr. P.W.R. Petrie

PHYSICAL CHARACTERS:		Appearance	- clear and bright
		Colour	- normal
		Odour	- nil

CHEMICAL CHARACTERS:

Reaction	Neutral	
Free and saline ammonia	0.0211	parts per 100,000
Albuminoid ammonia	0.0034	" " "
Chlorine	0	" " "
N. as Nitrates	Absent	" " "
Total solids	41	" " "
1. Volatile	2	" " "
2. Fixed	39	" " "
On ignition	-	" " "
Total hardness	25	" " "
1. Temporary	7	" " "
2. Permanent	18	" " "
Poisonous metals	Nil	

(signed)
Officer in Charge,
R.A.F. Laboratory, Aden.

APPENDIX V

MEDICAL SERVICES IN THE WESTERN ADEN PROTECTORATE

Syllabus used at K.F. Hospital Sheikh Othman
for the training of Tribal Dispensers 1934 and subsequently

The general idea of the syllabus is practical work in the hospital, out-patient departments, wards and operating theatre on six forenoons a week, work in the hostel in the evenings and attendance at three lectures a week.

In the junior course three lectures will be
1. The structure of the human body.
2. Elementary first aid and hygiene.
3. Elementary nursing.

In the senior course the lectures will be
1. The structure and functions of the human body.
2. Elementary medicine and surgery.
3. Nursing.

The syllabuses for these courses are, roughly, as follows:-

Junior

Course 1.
- Lecture 1. The human body and its divisions into systems.
- Lecture 2. The cellular composition of the body.
- Lecture 3. The bony system - joints.
- Lecture 4. The heart and blood vascular system.
- Lecture 5. The lungs and respiratory system.
- Lecture 6. The digestive system.
- Lecture 7. The organs of excretion and secretion.
- Lecture 8. The organs of special sense.
- Lecture 9. The muscular system.
- Lecture 10. Revise 1 to 3.
- Lecture 11. Revise 4 to 6.
- Lecture 12. Revise 7 to 9.

On the day of the 13th lecture or during that week an examination will be held.

Junior

Course 2.

Lecture 1. Introductory. The privilege of helping others. Nothing done to help the sick is beneath the dignity of any true man.
General Principles - personal cleanliness - the meaning of asepsis.

Lecture 2. Wounds.
Abrasions, cuts, stabs, lacerations, gunshot wounds etc. septic and clean wounds.

Lecture 3.
(a) Haemorrhage, arterial, venous, and capillary. Methods of arrest.
(b) Burns and scalds - degrees and treatment.

Lecture 4. Ulcers, septic, chronic, gangrenous, and healing.

Lecture 5. Fractures of bones.
Long bones, skull, spine, pelvis, short bones. Bandaging and splinting.

Lecture 6. Conditions beyond dispensary treatment. Recognition and palliation e.g.
(a) in the abdomen, haematuria and stone in the bladder, hernia.
(b) Limbs; mycetoma, gangrene.
(c) Eyes; cataract, entropion.
(d) Growths. Enlarged glands and their sites.

Lecture 7. Abscesses - which and when to open.
True tumours - simple and malignant.

Lecture 8. Infective conditions. How caused, recognised, prevented. e.g. smallpox - vaccination; malaria - mosquito control; dysentery, cholera and schistosomiasis - water and food control; tuberculosis - milk and spitting; leprosy - isolation; syphilis.

Lecture 9. Hygiene and sanitation in an up-country village. Cemetery, rubbish heaps, water supply, fresh air, and house building. Reporting on deaths. Outbreaks of smallpox, plague, leprosy etc.
Revisals and examination as in Junior course 1.

Junior Course 3.
Lecture 1. Hygiene in hospital; the necessity for fresh air and cleanliness. Disposal of soiled dressings, excreta, etc. Bed making, special beds.

Lecture 2. Care of the sick; general nursing care. Taking of temperatures, pulse, and respiration.

Lecture 3. Asepsis and antisepsis. Sterilizing of hands, dressings instruments, and why. Antiseptics in common use.

Lecture 4. Hot and cold applications; baths, poultices, fomentations plasters.

Lecture 5. Fractures; nursing and first aid of fractures, preparation and padding of splints.

Lecture 6. Haemorrhages; varieties of bleeding, symptoms, and arrest. Points of compression, treatment, nursing.

Lecture 7. The administration of medicines; kinds of medicines, how given and why.

Lecture 8. The nursing of acute cases; pneumonia, heart and kidneys disease, rheumatism, tuberculosis.

Lecture 9. Nursing of acute cases, continued. Dysentery, tetanus, smallpox and influenza.

Lecture 10. Burns, scalds, and ulcers; classifications, complications, treatment.

Lecture 11. Poisoning and other emergencies; common poisons and their symptoms and treatment. Drowning and artificial respiration, accidents and first aid.

Lecture 12. Operations; preparation of patient before and nursing after. Preparation of instruments for the surgeon.

The senior course will not really cover much new ground but will go more fully into the work already done.

Senior Course 1. Will include function as well as structure in considering the systems of the body.

Senior Course 2.
Lecture 1. Weights and measures; the use of simple household articles in estimating doses etc.

Lecture 2. The dispensing of medicines; solids and fluids as:-
(a) mixtures.
(b) powders.
(c) pills, etc.

Oral and other methods of administration.
Lecture 3. Elementary laboratory methods. Examination of urine, faeces, sputum.

Lecture 4. Drugs used in specific diseases and their doses, e.g. dysentery, malaria, cystitis, coughs, constipation.

Lecture 5. Diet in health and disease.
(a) adults.
(b) children.

Lecture 6. Public health and preventive medicine.

Lecture 7. Eyes; conjunctivitis, trachoma, foreign bodies, injuries.

Lecture 8. Special systems. The syringing of ears and care of ear diseases. Nasal conditions. The throat; gargles and paints. The skin; scabies and ring-worm.

Lecture 9. Inflammation, suppuration, ulceration, gangrene. The opening of simple abscesses and the after treatment.

Lectures 10, 11, and 12 will be revisal with an examination in the 13th week.

Senior course 2.
Will follow the Junior course 3 programme but to a higher standard.

I am submitting all this to Dr. NAPIER so that he may add any comments - especially on Senior and Junior Course 1 which he has been in charge of. Miss BAIN who took Course 3 supplied the notes given under that course.

MEDICAL TRAINING DEPOT. BURAO: SYNOPSIS OF CURRICULUM

1. Details of individual lectures and demonstrations have been worked out for the Course, together with notes of illustrative examples, but these details are being modified as the Course goes on. It is hoped to have complete notes of every lecture in revised form at the end of the Course, together with all information required for the preparation by the Assistant Instructor of the demonstration material.

Several 'series' have been decided upon, as below, and the choice of headings may seem arbitrary. They have been designed to allow a synthetic method of teaching with constant repetition but by different approaches.

The first three months of the curriculum have been arranged to give a broad basis of understanding together with all that is required of an askari Dresser in the field, and a junior assistant to a Hospital Dresser. The second three months will train them to be reliable Dressers.

2. FIRST THREE MONTHS

ENGLISH. Total 180 lectures; 225 hours.
A memorandum on the English course is attached.

MEDICAL LECTURES

Total of 96 lectures; 162 hours.

The systematic series of lectures are as below, and comprise a total of 72 lectures (132 hours), and are given in the morning as shown in the time-table.

A further total of 24 lectures (30 hours) is given on Tuesday and Thursday afternoons (the usual operating days), and these lectures do not fall into the scheme below. They are improvised, and include lectures in the wards on particular patients, various demonstrations which do not come within the Systematic lectures, operations and so on - also dissections of amputated parts whenever this is practicable.

The various series are as follows:

Anatomy and Physiology: Elementary synthetic anatomy only, with rather more detailed applied anatomy. Broad features of physiology, with a knowledge of the functions of all the main organs of the body, the common disturbances thereof, dietetics and so on. Total 21 lectures

Bacteriology and Infection: Understanding of nature, size, universality, and impossibility of wiping away; to be made deeply 'bug-conscious'. Infections and infectious diseases - modes of spread of germs - applied simple pathology - prophylaxis and bacterial aspects of hygiene. Total 4 lectures

Asepsis: Technique. Antiseptics. Simple procedures. Sterilization, some theatre work and assistance at operations. Total 6 lectures

Clinical Methods: Taking of pulse and temperature, recording these in English, and appreciating significance. Urine collecting and testing for albumen. Appearances of stools. Signs of serious illness. Taking blood smears. Giving injections. Total 4 lectures

Nursing: All general principles. Handling patients - on and off beds, stretchers and operating table. Bed pans and urinals. Pre-operative preparation. After care accidents, splinting and fractures. Unconscious patients. Total 5 lectures

Medicine: (demanding no clinical sense)
(a) outline of diseases common in Somaliland: origin, prevention, recognition, treatment as may be carried out by Dressers or Stretcher bearers.
(b) common materia medica as in daily Hospital use, and as contained in Dresser's Boxes for S.C.C. units; powders, mixtures, lotions, ointments. Poisons. Total 19 lectures

First Aid: Wounds: haemorrhage - shock - fractures - burns.
Unconsciousness. Special emergencies - eye, ear, nose etc.
Bandaging, splinting. Thomas' splint. Total 10 lectures

Hygiene: Flies and mosquitoes: breeding, recognition, measures for control.
Sanitation. Personal hygiene.
Prophylaxis. Total 4 lectures
One lecture, with practical demonstrations, on economy.

3. Tests. It is proposed to test all pupils carefully at the end of the first three months. The stretcher bearers will be graded, and some will be rejected, before transferring them to the S.C.C. Training Depot.

The hospital servants will be tested in English and Medicine. From the results of these tests, the best form of campaign for the second three months will be decided. The following notes are for this reason not detailed further, as they are almost certain to be altered from the point of the number of hours devoted to different aspects.

4. SECOND THREE MONTHS

English. Including Notes in simple English covering the whole field.
Anatomy and Physiology: More detailed regional applied anatomy. Special stress on fractures, dangerous regions, main vessels and vital organs, sepsis in the hand etc. Applied physiology.

Clinical Methods: Some practical laboratory work - urine and blood. A little clinical sense may be instilled.

Bacteriology: Review. Show all types, taken from cases in hospital.

Surgery: Uses of common instruments and names. Sorts of instruments needed for common operations. Pressure sterilizers and sterilization technique. Mock operations and major dressings.

Asepsis: Full ritual. Great strictness in order to prevent tendency to progressive slackness afterwards. To assist at minor operations under very close supervision.

Nursing: Handling hospital patients. Post-operative care and pre-operative preparation. Anaesthesia. Pre-operative preparation and fractures, extensions, after-care. Nursing specific diseases: fever, pneumonia, V.D., inflammations and sepsis; vomiting etc.

Medicine: More detailed - (a) Common diseases, treatment such as Dressers may carry out: intravenous injections. Individual taking of sick-parades.
(b) Materia medica, including some knowledge of elementary dispensing and posology.

First Aid: Consolidate and expand.

Arithmetic: Simple arithmetic will be taught during the second three months, but it is not yet known how many lectures this will take.

5. A detailed list showing the lectures and the number of hours spent on various subjects during the second three months will be forwarded as soon as the tests at the end of December 1941 have been finished.

MEDICAL TRAINING UNIT. BURAO Ref. 12/M3/73 (iii)

MEMORANDUM ON THE TEACHING OF ENGLISH

1. The teaching of English here has been complicated by several facts: I have no experience of teaching this subject, and have been unable to obtain any guidance; the pupils are adult; there is a very short time for them to be taught both English and medical work, and the two cannot be taught at the same rate; it is necessary to have a medical vocabulary; it is not possible for me to attend all the English and medical lectures as well as perform my hospital duties satisfactorily - particularly was this so at the beginning of the course.

2. Some of the pupils know a little reading and writing. For obvious reasons, the first month or two teaching English was rather experimental, and doubtless some time was lost in this way, but a more consistent scheme is now in operation. The next course will see an enormous improvement.

3. The several odd primers which we have, have not proved very useful. Much time was being spent in learning irrelevant words and constructions, and also even idioms which were out of place. It was decided to make our own primers, using a more practical vocabulary, and designed for teaching adults. "I threw some nice cake to the ducks in the pond" was thrown over, ducks and ponds being almost mythical in Somaliland, and cake at a premium. Sheets were typed out starting with simple words and an illustration or two. Simple sentences were then built up, starting with such as 'I have a bed' and going on to "There is a bug in this bed, and bugs are bad. But Ismail has no bugs in his bed because he is clean".

4. Finally, when simple words and constructions are properly grasped, sheets are provided containing notes of the lectures they have had, in simple sentences, with new words underlined. Some of these are in questionnaire form, with the questions (What is fever? Is malaria a fever?) on one side and the answers on the other (Fever is sickness when the body becomes hot. Yes, malaria is a fever because the body becomes hot).

The whole class is divided into several groups of different standards.

5. The tendency to fancy writing which soon becomes illegible has been suppressed rigorously. An attempt to introduce a simplified script was abandoned because the pupils were learning a form of writing different from that of the clerks. The first thing concentrated on after learning the alphabet was to be able to pronounce all three and two letter combinations. Somali names and words were then divided up into syllables and spelt out. Once phonetic writing was understood, exceptions commonly encountered were taught. By this time sheets were being distributed containing sentences and words which were practically phonetic.

6. It is not known just how long the Arithmetic lessons will take. I would be grateful for guidance in this respect.

MEDICAL TRAINING UNIT:

TRAINING POLICY

1. Interpretation. The audience is intelligent but needs to have interest constantly sustained. They are also totally lacking in any sort of basic education. The greatest difficulty is that of language. Long sentences and descriptions given to the interpreter allow interest and attention to flag. Facts should be presented slowly by single sentences accompanied by gestures or demonstration, leading step by step to a logical conclusion. Humour and picturesque speech, and familiar similies, are invaluable.

"Bones are the framework of the body, and are composed of...". This is a bad approach. Much better would be:
"If all the bones were suddenly taken away from a man he would collapse into a heap of meat."
"In the same way, if the sticks were taken away from a gurgi, it would collapse into a heap of mats."
"The bones give the body its shape and stability," and so on.

2. English. The teaching of written and spoken English is essential if a Dresser of any value is to be turned out. If English is rather concentrated on (especially spoken) during the early part of the course, then the pupils are later able to learn a very great deal by listening to the short simple sentences of the teacher, and then to the interpretation which follows.

3. The audience is bored by pure theory.
Everything mentioned should be shown or demonstrated. Preparations should be made enabling pupils to see a nerve ending in a muscle, and a muscle isolated with its tendon and attachments to bones; bacteria taken from a case they know should be shown alive under the microscope, and so on.

4. To start with 'basic sciences' and work up in the traditional style make for loss of interest. Practical aspects must be dealt with at the very beginning.

5. In addition, revision should be continuous and not terminal. Interest is therefore best kept alive by having several series of lecture-demonstrations running concurrently and providing variety with logical sequence.

6. Retention may be assured by overlapping the series and by constant repetition of facts in different forms. Perhaps it is an advantage that the pupils cannot take notes.

7. All the different series should be started early in the course so as to enable material to be repeated after the lapse of some time so that understanding grows up as a whole without being divided up into compartments.

T I M E - T A B L E

		Hours	Hours per week of 5½ days
6.30 to 8	English	1½	9
9 to 10	English	1	6
10.15 to 12	Med. Lecture-demonstrations (12.30 on Sats.)	1¾	11
3 to 4.15	English on Monday, Wednesday and Friday	1¾	3¾
	Medical Lect. (Rev.) on Tuesday, Thursday		2½

Subject	— ONE WEEK — Hours	Lectures	— THREE MONTHS — Hours	Lectures
English	18¾	15	225	180
Medical, Systematic	11	6	132	72
- Revision etc.	2½	2	30	24
Total Medical	13½	8	162	96

MEDICAL TRAINING UNIT. BURAO — Ref. 1/M31/92A

T I M E - T A B L E: Second Three Months

		Hours	Hours per week of 5½ days
6.30 to 8	English	1½	9
9 to 10	English	1	6
10.15 to 12	Med. on Mon. Wed. Friday (12.30 on Sats.)	1¾	5¼
3 to 4.15	English: Mon. and Wed.	1½	2½
	Medical: Tues. Thurs. Friday	1¼	3¾

Subject	— ONE WEEK — Hours	Lectures	— THREE MONTHS — Hours	Lectures
ENGLISH AND ARITHMETIC	23½	17	279	204
MEDICAL LECTURES	9	6	108	72
			387	276

Memo:

Arithmetic, Estimated at		21	12
English "		267	183

APPENDIX VII

A. Initial Outlay

The following estimates are prepared by the courtesy of Mr. R. Struthers, M.I.C.E., of the Air Ministry Works Directorate.

PROPOSED HEALTH AND MEDICAL TRAINING CENTRE - DHALA'

see also Drawing ADN/4095/43* 17th February 1943

Construction 18" Mud Brick Walls in mud mortar and lime plastered and lime rendered externally - Lime Concrete floors and reed lath roofs flat with mud and lime finish and 12" Parapet walls - all doors and windows with double sashes for mosquito proof with verandahs.

			Rs.	Rs.	Rs.
Wards No. 2	Pitch roof and p.c.c. floor as A.P.L.	3 4 -			
	Flat roof, lime floor and mosquito proof	4 -			
Dormitory		3 8 -			
Communal	3290 F.S.		3 8 -	11,515	- -
Staff Quarters and Refectory	1863 F.S.		4 - -	7,452	- -
Cookhouse	615 F.S.		3 12 -	2,321	- -
Latrines	208 F.S.		5 - -	1,040	- -
Hospital	1560 F.S.		4 8 -	7,020	- -
				29,340	- -
4" Murram as Centre Square etc.		Say.		1,500	- -
Drainage		Say.		1,000	- -
				31,840	- -
	10% Contingencies			3,184	- -
				35,024	- -
	Add 40% on Schedule			14,009	- -
Add.	Fencing				
	Water Supply and Diesel Pump			3,000	- -
	Electric Lighting			1,200	- -
	" Generating Plant (Diesel)			5,200	- -
				Rs. 58,400	- -

But this can only be taken as a very approximate estimate as no definite figures are known of the cost of construction at Dhala' nor of the accessibility of the service of the water etc. This estimate is based on the current prices in Aden at present.

R. Struthers,
17.2.43.

* Not reproduced here

Dispensaries. Initial outlay say £50 each.

Drugs, instruments etc. Initial outlay say £300

Total initial outlay say £6,000.

B. Recurrent Expenditure

Drugs, dressings etc. £100 per annum.

Medical Officers. £400 - £500 per annum each.

Other Foreign Staff £300 per annum each.

Arab Hospital Staff. 3 @ £100 = £300 per annum.

Tribal Orderlies. 15 @ £30 = £450 " "

Each Tribal Dispensary. £10 per annum say £100 per annum.

Total Recurrent Expenditure say £3,500 per annum.

APPENDIX VIII

The following extract from a letter from Dr. H. C. TROWELL is of interest in this connection. It is in reply to a letter asking for his advice on medical training for the Protectorate:-

"You must certainly train them at a hospital away from a large town. It will be much in the outpatient department and not too much in the wards --- The tendency is to give long hospital training as a nurse and then use the man as a junior diagnostician ---- He must learn "spot' diagnosis.

I agree that the training centre should have continuity of staff, should master the language and be able to inspect results.

You must get literate people and pay enough to command the standard. They must be paid from central funds and receive drugs free. I doubt if they can collect fees - a hopeless system ---

The course must be at least two years and preferably three years.

Preventive sides and hygiene must be taught".

At the end of his letter Dr. Trowell says that there would be no objection to "the translation of all or any part of the Handbook for Dressers and Nurses".

He also sends three smaller books which he suggests might be even more suitable to our purpose. They are

Bailliere's Medical Manuals for Africans

1. Anatomy and Physiology and causes of Disease
   John P. Mitchell, O.B.E., M.D.
2. Nursing. Ruth A. Bagot, M.B.E.

and 3. Diagnosis and Treatment of Diseases in the Tropics.
   H. C. Trowell, M.D., M.R.C.P.